MACROPHYTES OF ANSUPA

Susanta Nanda
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Chilika Development Authority



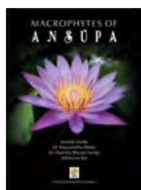
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PREFACE

Ansupa is the largest freshwater lake of Odisha, situated along latitude 20˚26' 28.43" to 20˚28' 44" and longitude 85˚ 35' 56.74" to 85˚ 36' 30.01" in Banki block of Cuttack district. It is situated among the undulating hills of Eastern Ghats with tropical forest cover. The Mahanadi, largest river of Odisha, is flowing adjacent to the lake on the southern side. Primarily, this is a floodplain wetland and its biological resources especially fish stock is completely dependent on the flood water of Mahanadi. The fishery resources of Ansupa Lake is a reflection of fish diversity of Mahanadi River and the fish stock comprises the famous Indian Major Carps, minor carps, catfishes, murrels and small indigenous fishes. Adjacent to the lake, a very old fort "Saranda Garh" exists on the top of Saranda hill which speaks the old history of "Saranda Garh". The name of Ansupa derived from the word "Ansa" i.e. a part of River Mahanadi. Therefore it was known as "Ansapata". It is also known as 'Hansapata' as it attracts thousands of waterfowl every year. This lake is an important wintering, summering, moulting and breeding ground for many species of Wetland birds. In winter, Ansupa is a major attraction for its scenic natural beauty and an attractive place for nature lovers to enjoy the beauty of nature and observe wildlife.

Ansupa provides ample livelihood opportunities for the local inhabitants living around the lake. There are thirteen villages situated inside the catchment area of Ansupa with a population of around eighteen thousand. They mainly depend upon the lake for fishing, agriculture, ecotourism and collection of aquatic plants etc. Abundant fish stock of the lake provides year around fishing opportunities for more than 320 households belonging to Subarnapur and Malbiharpur villages near the lake. Landless people also cultivate rice and vegetables in the adjacent areas of the lake. Humus soil with various organic fertilizers and nutrients, results in good crop productivity. Ansupa Lake and its shoreline of the lake harbors a good number of macrophytes, many of which are edible and many have medicinal values. Sustainable harvest of these plants may create opportunities for local villagers. For example; Lotus (*Nelumbo nucifera*) flower has religious value which can be collected and sold. Additionally, seeds of this plant with high nutritional value can be used as vegetable. Furthermore, seeds of Makhana plant (*Euryale ferox*) can be used as vegetable & has plenty of medicinal value too. Similarly, fruits of Water Chestnut (*Trapa* sp.) are commercially important.

As per the version of great poet Radhanath, the ansupa is still unknown to literary mass. Till now, some stray articles on science and literature are published in different national and international journals. Though macrophytes have profound socio-ecological importance, still very limited attempts were taken in the past to understand the diversity and distribution pattern inside the lake. However to bridge this information gap, an attempt has been made to publish a book entitled "Macrophytes of Ansupa". This book presents a comprehensive checklist and diversity of macrophyte species available in Ansupa and their individual description with digital colour plates of the plant focusing their systematic account, distribution, economic and medicinal importance etc. This book includes the aquatic and semi aquatic macrophytes which grow inside and along the shoreline of the lake. Other important information about the lake like water quality, bathymetry and importance of macrophytes etc. are furnished with the comparative statements of different years. This book is an outcome of years of sincere and hard work. We hope this book will be highly useful for researchers, teachers, students, wetland managers and common man as well as adding another valuable feather in the glorious crest of Ansupa Lake.

Authors

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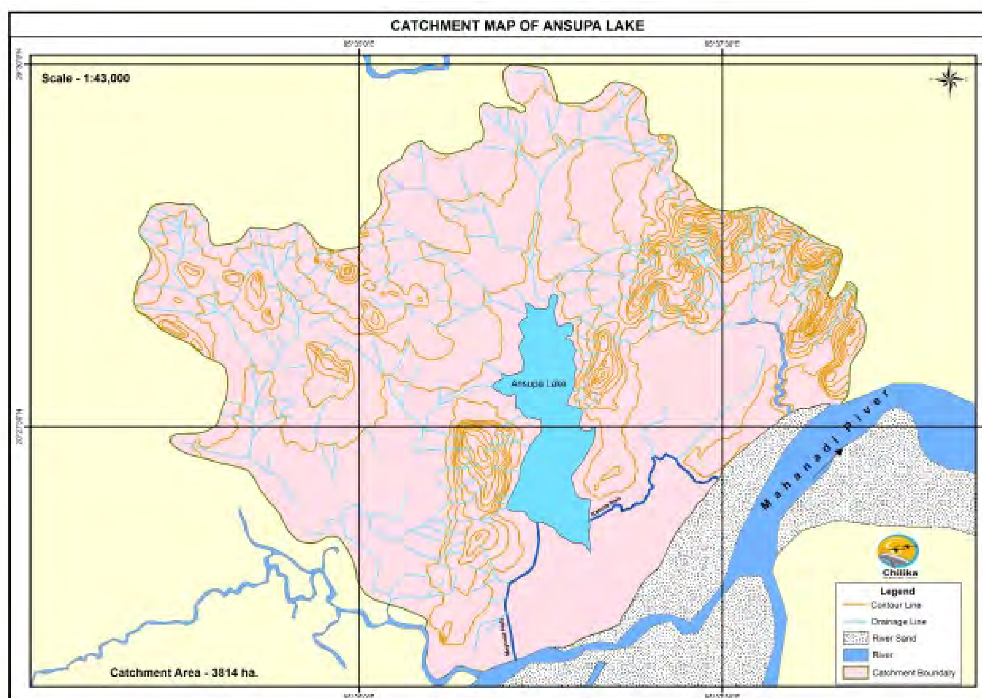


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1.0 INTRODUCTION

1.1 ABOUT ANSUPA

Ansupa is the largest freshwater lake of Odisha, situated along latitude 20˚26' 28.43" to 20˚28' 44" and longitude 85˚ 35' 56.74" to 85˚ 36' 30.01" in Banki block of Cuttack district. It is situated among the undulating hills of Eastern Ghats with tropical forest cover. Crystal clear water, hills and chirping sounds of birds attract many Eco tourists towards the lake. Scenic beauty of the lake was adored by many poets and philosophers. Its calmness, scenic beauty and forest coverage really attract the visitors during the time between the sunset and evening, when the sun undergoes Saranda Hills; an unusual calmness prevails in the area. Water of the lake is very clear and used by the surrounding villagers for drinking, bathing and irrigation purposes. It is very famous for fresh water fishes especially like *Labeo bata* locally known as 'pohala'. Adjacent to the lake, remaining of a very old fort "Saranda Garh" is present on the top of Saranda hill. The name of Ansupa derived from the word "Ansa" i.e. a part of River Mahanadi. Therefore, it was known as "Anasapata". It is also known as 'Hansapata' as it attract thousands of waterfowl every year. This lake is an important wintering, summering, moulting and breeding ground for many species of wetland birds. Several indigenous fresh water fish species harbour the lake which supports livelihood of local fishers.



1.1.1 Historical Importance

The last king of Keshary dynasty of Odisha, King Subarna Keshari Deb was defeated by the king Chodganga Deb of Ganga dynasty in the year 1135 A.C. After defeat, he came to a deserted place along the bank of Mahanadi River which was surrounded by hill ranges and deep forests. He established many villages like Subarnapur, Malabiharpur, Ostia, Phulbadi, Ghodabara, Paikamala, Ratagarh etc. For his safety, he built a fort on the top of the Saranda Hill known as Saranda Garh. Presently, the remnants of the ruined Saranda fort, Armoury (Barudghar), "Bhaibohu well", "Kaudikhata" and other remnants are seen in the hill top.

1.1.2 Topography

Ansupa lake is a topographic depression surrounded by small hillocks such as Saranda (124 m) on the West, Bishnupur (65 m) on the east, Dhanagarh (160 m) on the North and Betla pahad (105 m) on the Northwest. The surrounding areas are undulating plain with isolated hill ranges that dissected valleys. The lake is connected to Mahanadi through "Kabula nala" the channel through which flood water from Mahanadi enters the lake. The "Huluhula nala" on the Southwestern side serves as outlet. The catchment area of Ansupa is spread over 5231.0 ha. The water spread area of the lake is 382 acres. The length of Ansupa lake is 3 kms and breadth varies between 250.0 m to 500.0 m. The average water depth of the lake varies between 0.5 m to 4.20 m during different seasons.

1.1.3 Climate

The climate of Ansupa is Tropical with three distinct seasons i.e. summer, monsoon and winter. Both South-West and North-East monsoon have influence the climate of this area. The maximum temperature is 43˚C during hottest month of May and minimum 12˚C during January with the mean 28˚C temperature round the year. It receives 1020.9 mm rainfall annually with the mean precipitation 85.1 mm. Average wind speed recorded is 10 km/h.

1.1.4 Geomorphology

Ansupa is lying within the alluvial plain of river Mahanadi. The geomorphic units are hills, pediments alluvial plain and back swamp. In the east and west side of the lake denudational hills are present and in the north pediments are prominent.

1.1.5 Water spread area

The lake has a water spread area of 1.62 sq. Km (162 ha) in summer and more than 2.0 sq.km (200 ha) in the flood season. According to 1972-73 Survey of India

toposheet, the water spread area of Ansupa lake was 1.8 km^2. ORSAC reported an area of 1.62 Km^2 in the year 1986 (Landsat T.M. FCC 86). In 2001, Chilika Development Authority had delineated the water spread area of Ansupa Lake from IRS – ID Liss-III 11/05/2001 which was 1.66 sq.km. Recently, water spread area is 119 ha. as per Sattelite image taken on 14th March 2019.

1.1.6 Weed Infestation

Due to de-weeding process, the Ansupa Lake is cleared from floating and submerged weeds. In the past, the lake chocked with aquatic weeds resulting in reduction of fish harvest. Among many species of weeds/aquatic plants, the weed like water hyacinth *(Eichhornea crassipes) & Hydrilla vertisillata* causing menace to the lake. Survey conducted by ORSAC in 1989-90 showed that water hyacinth grows luxuriantly in northern and southern part while dominant sub-merged weeds like *Hydrilla sp, Ceratophyllum sp.* and *Najas sp.* covered almost all parts of the lake, having small patches of clear water in the central and northern sectors. Rooted emergent plants are growing in the northern part of the lake. Decomposition of large quantity of weeds is increasing organic sedimentation in the eco-system causing decrease in depth and eutrophication in shallow and fringe areas. Recently, Chilika Development Authority has been initiated the process of removing of the aquatic weeds manually by engaging local people as well as mechanically by utilizing a Amphibian Weed Harvester. As per the recent satellite image, taken on 14th March 2019, 119 ha area of the lake was cleared from the invasive weed and rest of the area was left undisturbed for the utilization of Rails and Gallinule bird species.

1.1.7 Bathymetry

The Department of Fisheries and the Central Institute of Freshwater Aquaculture (CIFA) in a joint survey during 1989 recorded the mean depth of the lake which varied between 1.83m in summer and 2.76 m in flood season. The ORSAC, while undertaking Environmental Study of Ansupa Lake, recorded the maximum depth of 4.23 m in the central part and minimum of 1.32 m in the southern part in winter of 1989 and the minimum and maximum depth of 0.73 m and 3.7 m respectively in the summer month of 1990. As per the report of Bhatta, 2001, the depth of the lake in the central part was 3.58 m in January, and 3.2 m in the month of June. As per recent survey conducted by Chilika Development Authority, in 2019, maximum depth of 2.64 m was recorded at the central part of the lake whereas minimum depth was recorded 0.31 m with mean depth of the lake being 2.51 m, with seasonal variation.

1.1.8 Inlets and Outlets

Although in the past Hulhula Nala and Mayurdhara Nala were functioning as the main inlets for flow of Mahanadi water into the lake through the northern sector

during monsoon floods, they are completely defect at present being cross-bonded and encroached by the local villagers for agricultural activities. The Kabula Nala act as main outlet when flood level decreased in the river Mahanadi. The "Hulhula Nala" was functional when there was effective exchange of water between lake and the river, auto stocking of riverine fish fauna, removal of weeds and silt and prevalence of good depth and water quality.

1.2 WATER QUALITY

Sound knowledge and understanding of all the water quality parameters that influence the distribution of biota of the ecosystem is essential for sustainable management of Ansupa lake. The biological phenomenon occurring in the lake ecosystem pertaining to different biological regimes such as phytoplankton, algae, macrophytes, fish, prawn, benthos, etc. are directly or indirectly influence the intrinsic properties of the water. Hence, the water quality data of Ansupa Lake is important for the lake ecosystem.

1.2.1 Air temperature

The atmospheric temperature of Ansupa influenced the water temperature of the lake. The air temperature was varied from 27.0 to 34.0^{0}c during the study period. The lowest value was observed during winter season and highest value in summer season. The northern cool wind influenced the lower temperature in winter due to denudation of barren hills the higher temperature prevailed in summer season.

1.2.2 Water temperature

Water temperature has direct impact on the flora and fauna of the lake. Surface water temperature was varied from 26.0 to 32.0°C whereas bottom temperature varied from 26.0 to 30.0°C. The water temperature fluctuated like air temperature. The water temperature was less than atmospheric temperature. The bottom temperature is less than the surface temperature in the most of the small lakes; this trend has seen due to non-circulation of temperature in the lake. The variation of temperature between surface and bottom was prevailed.

1.2.3 Transparency

Transparency of water shows the clarity of water body and growth of phytoplankton and zooplankton of the lake. Water transparency was fluctuated from a minimum of 39.0 cm to a maximum of 150.0 cm. The lowest value was recorded in monsoon and highest in winter season.

1.2.4 Total Suspended Solids (TSS)

Total Suspended Solids are the indication of sedimentation of waterbody. It varies with entering of flood water or external disturbance of water body. It is varied from 0.09 to 0.41 gms/liter in surface water and 0.07 to 0.38 gms/liter in bottom water in Ansupa Lake. The lowest TSS value was observed in winter both in surface and bottom water of the lake. This might be due to settle down of the sediments in bed, brought from the catchment area. The higher value in rainy season might be due to rain water along with sediment entered to the lake from its catchment area and hills.

1.2.5 Conductivity

The conductivity of the Ansupa lake ranged from 0.1 to 0.3 milli mho/cm in both surface and bottom water. The bottom conductivity is higher than the surface water. The higher values were observed during summer season as conductivity is the concentration of soluble salts present in the lake water due to evaporation of water in summer days in this small lake. The conductivity has been increased in summer season which decreased in rainy season with increase of water depth. The conductivity of Ansupa water is very poor.

1.2.6 pH

The pH of water plays a great role in the biodiversity of the lake. It was observed that the pH of surface water varied 7.1 to 9.7 and bottom water from 7.0 to 8.1. The higher pH was recorded during rainy season in surface water. At the same time, the pH of bottom water decreases by 2.0 from surface water. This higher pH in the surface might be caused by the activities of macrophytes in the surface area. The water of the lake is alkaline in nature throughout the year.

1.2.7 Total Alkalinity

The total alkalinity of lake water at different stations was varied from 44.0 to 96.0 ppm in surface and 46.0 96.0 ppm in bottom water. The higher value was recorded in summer season and lower value during the winter season. In most of the lakes, higher value was observed during summer season.

1.2.8 Hardness (Ca^{+2} and Mg^{+})

Both Calcium and Magnesium hardness contributes to total hardness of lake water. Hard water lakes have high buffer action. Calcium hardness was fluctuated from 20.0 to 80.0 ppm in surface and bottom water. It was observed that the bottom water of the lake was more calcium hardness than surface water. The higher data was recorded during summer season and lower in rainy season like alkalinity.

Magnesium hardness was fluctuated from 10.0 to 150.0 ppm. The higher value was recorded during winter season.

1.2.9 Dissolved Oxygen (DO)

Dissolved oxygen content of lake water is very important for biotic components. It is found mainly in the lake due to photosynthetic activities of phytoplankton and hydrophytes. The dissolved oxygen content of lake water was varied from 2.0 to 12.6 ppm in surface water and 1.2 to 6.2 ppm in bottom water. The higher value was observed in the surface water in rainy season. The higher value was due to photosynthetic activities of *Hydrilla verticilata* and other macrophytes. The lower value of DO in bottom of the lake during the same period might be due to the presence of more benthic organisms in the bottom of the lake. The lower DO in summer season might be due to decaying of macrophytes during the period. In general, except summer season the DO of the lake is in higher side for the growth of biotic communities.

1.2.10 Sodium

Sodium concentration of the lake water was varied between 6.0 to 38.3 ppm in surface and 7.0 to 31.2 ppm in bottom. Like most of the parameters, higher value was recorded during summer season, moderate in winter and lower in rainy season.

1.2.11 Potassium

It is an important nutrient for the growth of phytoplankton, algae and macrophytes. It varied from 0.0 to 6.0 ppm in surface and 1.0 to 5.3 ppm in bottom water of the lake. The higher value was recorded during summer season. This might be due to leaching from the decaying macrophytes and the lower value during monsoon might be due to the nutrient used by the hydrophytes and plankton present in the lake. The surface water has more potassium content than bottom water.

1.2.12 Nitrate

It is most important nutrient and plays significant role in eutrophication in the lake ecosystem. It varied from 0.01 to 0.9 ppm in surface and 0.03 to 2.2 ppm in bottom water at Ansupa lake. The bottom water had more nitrate value than surface water. The higher values were recorded during summer season and the lower values in winter season. The lower value in winter season might be due to the nitrates taken by the phytoplankton for their growth and development. The nitrate value of the lake is higher side.

1.2.13 Ortho-phosphate

It is an important nutrient for the growth of plants present in the lake and play major role in lake eutrophication. It fluctuated from 0.01 to 0.26 ppm in surface and 0.01 to 0.31 ppm in bottom water at different stations of the lake. Like nitrate it had also found more in bottom water than surface water. Lower value was observed in rainy season and higher value in summer season.

1.2.14 Bio-chemical Oxygen Demand (BOD)

The BOD has direct bearing on the oxygen balance of the waterbody. BOD is considered as index of organic pollution. BOD of surface water was ranged from 0.2 to 6.0 ppm. It is within the limit. The standard prescribed by World Health Organisation (WHO), the minimum limit of pollution by BOD in raw water is 6.0 ppm.

1.2.15 Chlorophyll "a", "b", and "c"

Chlorophyll "a", "b", and "c" were recorded at six stations of Ansupa lake during the month June 2001. Chlorophyll "a" was varied from 7.78 to 18.24 mg/l, Chlorophyll "b" from 0.1 to 5.22 mg/l and Chlorophyll "c" from 0.0 to 1.9 mg/l. The lake was rich with chlorophyll "a". This might be due to phytoplankton as well as some chlorophyll pigments mixed with lake water from submerged macrophytes.

1.2.16 Macrophyte biomass (Fresh weight)

Macrophyte biomass was collected from Ansupa Lake. The fresh weight biomass of macrophytes were varied from 2880.0 to 7976.0 gm/m^2 in the lake. The dominant weed *Hydrilla* sp. contributed 4760.0 gms/m^2 followed by *Eichhornia* sp. being weighed 4248.0 gm/m^2 (Shoots 1980 gms and roots 2268 gms). The third dominant weed was represented by *Ceratophyllum* sp. weighed 3716.0 gms/m^2. Besides these, the other dominant weeds like *Nelumbo* sp. recorded 1680.0 gms/m^2 and *Nymphaea* sp. weighed 1832.0 gms/ m^2 . From the above data, it is clearly showed that the lake was heavily infested by weeds (Bhatta, 2001).

1.3 BIODIVERSITY

The lake and its catchment area is a treasure of biodiversity. Faunal diversity includes 61 species of Fishes, 5 species of Prawns, 10 species of Amphibians and Reptiles, 54 species of Dragonflies and Damselflies, 88 species of Butterflies, 194 species of Birds and 26 species of Mammals. Similarly, 244 species of macrophytes were recorded from the lake including 182 species of semi-aquatic and 62 species of aquatic macrophytes. It is also home to 32 species of Zooplanktons and 44 species of Phytoplanktons. Total 09 species of benthic faunas were recorded from lake.

2.0 MACROPHYTES

Macrophytes are aquatic photosynthetic organisms, can seen through naked eye, that actively grow permanently or periodically submerged below, floating on, or growing up through the water surface. Aquatic macrophytes are represented in seven plant divisions: Cyanobacteria, Chlorophyta, Rhodophyta, Xanthophyta, Bryophyta, Pteridophyta and Spermatophyta. Globally 2,614 species of macrophytes are found belongs to 412 genera, 88 families and 33 orders (Chambers et al. 2008) but in India, the macrophyte species diversity exceeds more than 1200 (Gopal, 1995). Though several attempts were taken to classify the macrophytes, but Hutchinson (1975) is widely accepted and unique ecological classification. He classified the macrophytes on the basis of life form based classifications (grouped by the relation of plants to water level and substratum) and growth form based classification (grouped by structural similarities and relation to physical environment). Those are 1. Emergent macrophytes 2. Floating leaved macrophytes 3. Free floating macrophytes and 3. Sub-merged macrophytes.

2.1 ROLE OF MACROPHYTES IN THE WETLAND ECOSYSTEM

Macrophytes are important part of wetland. They help in various biogeochemical in wetland eco system cycles. They act as primary producers, indicators of nutrients, helpful in Nitrogen-fixation, decomposition etc.

Macrohytes have the capacity to purify wastewater through the uptake of dissolved Nitrogen, Phosphorus and desirable excessive minerals including heavy metals.

These are providing habitat for many macro invertebrates, bacteria, periphytons, zooplanktons, amphibians, fishes and waterbirds.

Many invertebrates and fishes use macrophytes as there refuge habitat from predators.

Many birds, fishes, amphibians and flies used macrophytes as their reproduction shelter.

These are used as important food resources for human,livestocks, birds, fishes and other invertebrates. After decomposition, they provide food for bacterial species.

Microclimate of the lentic ecosystem is controlled by macrophytes.

Aquatic macrophytes are used as “bioindicators” for the assessment of various environmental factors and their impacts. Excessive growth of macrophytes lead towards the eutrophication whereas absence of macrophytes may indicate the problem in water quality.

2.2 MACROPHYTE AS WETLAND RESOURCE

Aquatic weeds are considered a menace and a nuisance because of their great potentials and economic value are not truly understood. These aquatic plants are generally more productive than their terrestrial counter parts. Moreover, they do not compete with conventional crops for fertilizer, water or land. Their natural profuse growth in the humid, tropical and sub-tropical areas of the world, requiring no intensive cultivation, makes them a promising source of multipurpose raw material.

Taking examples of wise use of wetlands in the East Calcutta, it is apparent that there is sufficient scope for improvement in the economic performance of the bheris by increasing the floristic diversity and the by introducing commercially viable species that would not impede upon the core resource recovery practice i.e. fishing. Addition of these species in the system may yield several benefits like enhancement of wildlife habitat from increasing vegetation cover, creation of nesting and roosting ground for birds and ultimately enrichment of bio-diversity in addition to economic support to the local farmers.

It is now known that freshwater ecosystem is an important productive ecosystem on earth and it appears that certain types of aquatic macrophytes like rooted emergent species and floating species may be the most productive vegetation of all. These plants have their roots in sediments beneath water and with the photosynthetic parts of the plant in the air. The mud around the roots may be a good source of soluble nutrients, which can diffuse to the roots via the sedimental pores. Thus, they make the best of both aquatic and terrestrial environments.

2.2.1 Makhana (Kanta Padma) Cultivation

Makhana (*Euryale ferox*) is a seasonal or perennial giant water lily having flat leaf surface. In odia, it is called as "Kanta Padma". The leaves, petioles, sepals and fruits of Makhana are covered with semi-delicate bent prickles. Makhana is an aquatic cash crop of North Bihar (Jha, *et.al,* 1991). Makhana can grow naturally with several other commercial floras like *Trapa natans* var. *bispinosa* and *Marsilea minuta*. Makhana supports a fully-fledged cottage industry which provide sustenance to a great extent of fishermen communities in North Bihar (Dutta, *et.al*,1986). Makhana was a common wetland flora of West Bengal. Makhana seeds are edible and fried seeds or puffs is extremely nutritious and consisting of 77% easily digestible starch. Food value of 100 gm Makhana puff is equivalent to same amount of fish. Makhana seeds are of immense medicinal importance. The same puff when sold in the Calcutta market the cost reaches upto Rs.150/- per kilogram i.e., the net selling value of the edible puff reaches upto Rs.107400/ha. For this makhana cultivation in Bihar is promoted by the local Government. For the sake of challenging profit from makhana

cultivation National Bank for Agricultural and Rural Development (NABARD) has included it in its funding programs. Export value of makhana is rather high. Thus makhana plants can be a good option for selecting.

2.2.2 Cattails (*Typha sp.*) Cultivation

Cultivation and management of Cattail, locally called hogla-pati (*Typha elephantine* and *Typha domingensis*) is more than a century old practice particularly found in the wetlands of lower Bengal. It is surprising that even today records of Hogla cultivation at the village/block level remains inadequate. More than 20,000 rural people of West Bengal engaged in this work. A coarse quality of mat and rain-shed are the major products prepared from dried hogla leaves. More than 3000 families get their sustenance from marketing of hogla. It has been estimated that the total input for the cultivation of hogla plant is approximately Rs.3000/ha/yr while net profit earned from selling of hogla products is about Rs.5000/-ha/yr, while selling mat Rs.9000/- from selling of rain-sheds.

Cattails (*Typha* sp.) are weeds pose serious problems. Fast growing, they invade new waterways and must be rigorously controlled. They invade rice fields, other irrigated agricultural lands, farm ponds, lakes and canals. Perhaps the cattails have greatest economic potential, since they also are a source of pulp, paper and fibre. It can probably be cultivated as fibre crop on waste lands since they are too wet for other purpose. Cattail paper is fairly strong and its leaf yield a soft fibre that has been used in mats, baskets, chair seats and other woven articles.

2.2.3 Shola (hat plant) Cultivation

'Shola' is obtained from the soft stem pith of *Aeschynomene aspera* and its cultivation for commercial purposes is restricted to mostly in West Bengal and Odisha. Shola hats brought from this area were widely used by the officials during the British period. Presently, the root of shola-art has penetrated into the social culture of this area. Very interestingly, it has been noted that female members of the village play 'catalytic' role in promulgating shola art in different parts of the state by virtue of matrimonial linkages. Net profit usually, earned from shoal cultivation is estimated to the tune of Rs.40,000/ha from selling of ornamental products. Export value of such product may earn additional 5-10 folds. More than 20,000 people of these are today dependent on shoal-art in the state. In Odisha, 'Shola' is used profoundly, during the preparation of different 'beshas' of Lord Jagannath and other deities in the various festival times. In Ratha Yatra, 'Tahiya' is the main attraction for deities, made up of sholas.

2.2.4 Mat Cultivation

Mat is obtained from two species of sedges, viz, *Cyperus pongorei* and *Cyperus corymbosus*. Although, inferior quality of mat is also prepared from several members of the family Cyperaceae like *Cyperus malaccensis, Cyperus iria, Cyperus exaltatus* etc. Good quality mat plant is cultivated in wet soil but water logging for a substantial period binder the growth. Major wetlands used for mat cultivation lie within the local people. Presently, beautiful paintings and silk-screen printing is done on fine mats which became very popular in the fancy markets (Ghosh, 1998).

2.2.5 Cultivation of Water chestnut (Panisingada)

Water chestnut locally called 'Panisingada' (*Trapa natans* var. *bispinosa*) is one of the traditional water crop of India (Hazra et al*.,* 1996). It is commercially cultivated for its edible fruits in ponds, freshwater lake in West Bengal and Odisha. It has been estimated that cultivation cost of water chestnut in one hector wetland area is approximately Rs.15, 000/-. While, net fruit productivity is about 100 quintals/ha. Net profit earned from water chestnut cultivation is estimated to be in the tune of Rs.28, 000 to Rs.40, 000/- per ha per season. Several hundred rural families presently engaged in water chestnut cultivation in West Bengal, Madhypradesh and Odisha.

2.2.6 Human food

Aquatic plants can provide three types of food, viz. Foliage for use as a green vegetable, grain or seeds that provide protein, starch or oil and swollen fleshy roots that provide carbohydrate, mainly starch.

Water spinach is a tropical trailing herb of muddy stream banks and freshwater ponds and marshes. The water spinach is a native to India, Southern China, where it is cultivated most. It has been introduced successfully to Fiji, Hawaii and Florida. Its fresh young leaves and stems are used as vegetable, boiled or cooked in oil, especially during summer months when other leafy crops do not grow well. It is also used for pickles.

Watercress prized as a fresh salad herb or as a cooked green vegetable is a rich source of iron, iodine and vitamin A, B, and C. *Neptunia leracea* is a curious plant with feathery leaves and stems made buoyant by their spongy white covering. The fresh plant is sold in the market as vegetable. The young plants are cooked as greens, the stems are crisp and juicy, Young seed pads also are cooked and eaten. Other aquatic weeds such as floating rice, wild rice, lotus, chestnut and arrowhead are used as human food.

Sprirulina, a blue green algae contains 60-70% protein and rich in vitamins particularly B12, appears to be a promising plant. *Sprirogyra* sp., green algae that occur in still water or slow moving streams are eaten as a vegetable or used as an ingredient in soups. The fresh-water red algae, *Lemanea mamillosa* is eaten as a delicacy in Assam and it is sold in dry form in the market at Manipur and is eaten by the local people after frying. Floating rice is the only aquatic plant, which is used all over the world as a human food crop. Wild rice, swamp tarro, arrowhead, cattail, etc., rich in carbohydrate are also consumed by man. Water spinach, chestnut, etc. are valued as vegetable in some tropical countries.

2.2.7 Livestock feed

Aquatic weeds are good source of protein; as such several species of macrophytes are used as animal fodder. The water buffalo *Bubalus bubalis* is found throughout the Asian tropics. It swims well and is perfectly at home in tropical swamps. It is a robust animal and is more resistant to water induced diseases, and water buffalo can feed underwater on submerged aquatic weeds. In Odisha, Chilika buffaloes feed submerged macrophytes like: *Potamogeton* sp., from Chilika lake. It is a good domestic animal for small farmers in developing countries. It provides milk, meat, hides and work power. Although preferring terrestrial grasses, the water buffalo will graze aquatic vegetation. It consumes the shoots of cattail, leaves of willow trees and water hyacinth. Feeding aquatic weeds to water buffalo is a promising technique. Water hyacinth can be used as food for pigs and one animal may consume about 1.5-2.0 kg of fresh plants per day. Sometimes, *Salvinia* sp., *Azolla* sp. and *Hydrilla* sp. are given as food for pigs and ducks. In India, *Spirulina* sp. produced in mass-culture is being used as a supplement for poultry feed. *Ipomea aquatica* is commonly given to pigs and is also used as cattle fodder. Water hyacinth deserves special mention since it cause problems in many areas but it is used as animal fodder and has been reported that feeding buffaloes with about 7.0 kg of water hyacinth increases their milk yield by 10-15% in most countries. Ducks, geese and swans are commonly known to be herbivorous, although they consume insects, snails, etc. Macrophytes may serve as food for these herbivorous and omnivorous water birds. They control weeds on the banks of waterways often cleaning aquatic weeds and algae from small lakes, ponds and canals.

2.2.8 Fish feed

The Chinese Grass carp is a fast growing fish that feed voraciously on many aquatic plants and grows to weight as much as 32 kg. It has proven to be exceptionally an effective control agent for submerged weeds in most of the countries. The grass carp feeds primarily upon submerged plants but will also eat small floating plants

such as duckweed, overhanging terrestrial plants. Bank grasses may be consumed when preferred plants are not available.

Cray fish are native to all continents except Antarctica. Over 300 species are known while few are exclusively herbivorous. They appear promising for aquatic weed control and utilization. Most cray fishes are omnivorous scavengers but readily become vegetarians if necessary. Some of the plants they eat can be noxious aquatic weeds.

Tilapia, silver carp, cray fish, grass carp, etc. are herbivorous fishes that feed on aquatic weeds. The fish such as grass carp prefers succulent-sub-merged weeds, which are difficult to control by conventional method. Tilapia is also a voracious feeder on certain plant species, *Puntius gonionotus* feeds on both filamentous algae and certain species of higher plants. *Puntius sp.* has been used successfully to control aquatic macrophytes in Indonesia. *Osphronemus gorami* is another fish that feeds mainly on plant leaves and has been introduced in irrigation wells in India to control submerged macrophytes. *Cyprinus carpio* is often reported as being effective in aquatic macrophyte control. It feeds on higher plant species such as *Ipomea aquatica*. The milkfish *Chanos chanos* feeds largely on a bottom complex of decayed green and blue green algae, diatoms, protozoans and detritus but will feed on green algae and *Chara sp*.

2.2.9 Cultivation of Supplementary Vegetables

Leafy twigs, petioles and rhizomes of several aquatic herbs are traditionally consumed by wider communities in Bengal and Odisha of which, *Ipomoea aquatica* or 'Kalama saga' is most prominent one. Kalama Saga is cultivated in the wetlands, ponds, freshwater river bank in Odisha. The water lilies (*Nymphaea nouchali* and *Nymphaea pubescens*) are significant for their market potentials. The aquatic herb like bramhi (*Bacopa monnieri*) is also consumed as supplementary vegetable for their medicinal values. All these herbs require minimum management expertise and can be cultivated elsewhere without manuring and usually using any pesticide in fresh water shallow constructed wetlands. Consumption of this wetland supplementary vegetable at least ensures minor chance of bio-magnification of pesticide in our body.

2.2.10 Cultivation of Lotus (*Nelumbo nucifera*)

Lotus flowers are sold in all the markets of Odisha. Even in villages, people used lotus flowers in different Puja Mandap and temples. It is highly demanded in festival season.

2.2.11 Harvest of Medicinal Plants

At least 40 species of aquatic herbs are significant for their medicinal values. Among these, few species are only marketed purely as herbal medicine. *Eclipta alba (*keshut*)* is marketed for its ability to improve the color of hair and the luster of eye. Makhana (*Euryale ferax*) seeds are extensively exported for its medicinal values in addition to its nutritional importance. In fact, rhizomes of both the *Nymphaea* sp*.* and *Nelumbo sp.* are extensively exported from Bengal for their medicinal significance. Brahmi leaves are commercially used in preparation of brain tonic. *Neptunia natans* and *Acorus calamus* are also sold in the city markets for their medicinal values. It is estimated that due to growing popularity of herbal medicine market demand of aquatic medicinal herbs is sharply increasing.

2.2.12 Cultivation of Aquarium Plants

Cultivation of aquarium plants is rather rare in wetlands of Bengal. A very recent survey indicated that *Vallisneria* sp*., Aponogeton undulates, Cabomba caroliniana, Hygrophila polysperma, Hydrilla verticillata* are extensively harvested from wild for supply in the aquarium market.

2.2.13 Organic or bio-fertilizer

For the yield of good and healthy crops, 16 elements are essential of which nitrogen, phosphorus and potassium are commonly deficient in agricultural soils. For high crop yields, addition and release of nutrients, particularly nitrogen, phosphorous and potassium must be sufficient, so that the nutrients are at a level of availability, sufficient to meet the demand of the growing crops. Aquatic weeds have been reported to be a good source or organic fertilizer or bio-fertilizer and contain appreciable amount of nitrogen, phosphorous and potassium. Composted aquatic weeds when applied to farmland have been reported to benefit the conventional crops. Aquatic weeds do not provide crops with nutrients, but they improve soil texture and increase water holding capacity of soils, which is very important in sandy, laterite and heavy clay soils, which are widely occurring in developing countries. *Azolla* sp*.* a good source of biofertilizer, is capable of reducing nitrogen demand of soil. Residual effect is also appreciable when aquatic weed compost is added to the soil. At the face of increased cost of inorganic fertilizers, this becomes an important additional advantage for different crops.

2.2.14 Energy

Aquatic weeds are converted to biogas by capitalizing upon one of nature's process for decomposing wastes by anaerobic bacteria. Methane producing bacterial are common in nature (For instance, in the stagnant bottom mud of swamps, where they

produce bubbles of methane known as "marsh gas"). If they are cultured on water hyacinth in a tank and sealed to keep out all air, they produce a biogass composed of about 70% methane and 30% carbon dioxide. The biogas burns readily. It can be used for virtually every application where natural gas is used, for example cooking, heating and as a source of power. In a limited way, it has been used to power stationary engines, tractors and cars. However, before the gas can be compacted into cylinders for use, the carbon dioxide must be removed.

2.2.15 Pulp, paper and fibre

Reeds, cattails and bulrushes generally grow in pure sands and these have been harvested for centuries to be consumed as food and utilized as pulp, paper or fibre. However, reeds are converted to pulp in mills. Printing paper, cellophane, card board and various synthetic fibres are derived from this pulp. The raw seeds and pulp mill wastes yield a variety of other products notably cemented reed blocks and compressed fibre board; chemicals like furfural, alcohol and fuel; insulation materials and fertilizer. Most of the reed pulp is mixed with wood pulp to increase the tear strength and the density of paper that is made from it.

The common reed can produce many other products. For centuries it has been used for peasant crafts, thatching fences and wind breaks. Its stems are still used in basketwork, as fire wood, fishing rods and weaver's spools and mouthpieces for musical instruments. Its roots are edible.

2.2.16 Purification of waste water

Compounds containing nitrogen and phosphorus, the major ingredients in NPK fertilizers happen to be common pollutants in waterways. Raw sewage contains various organic and inorganic materials such as cellulose, carbohydrates, fats, protein, urea, amines, soaps, etc. Disposal of these polluted water often created health problems in densely populated countries. It has been reported that some aquatic weeds scavenge inorganic and organic compounds from water. These weeds are capable of absorbing and incorporating the dissolved materials into their own structures. Effluent purified by aquatic weeds is cleaned of its pollutants and hence when released into waterways, causes less health and environmental problems. The clean water produced is generally suitable for reuse in irrigation and industry.

Aquatic weeds may also be used for removing potentially harmful elements or compounds from drinking water such as cadmium, nickel, mercury, phenol, potential carcinogens, etc. The important weeds that can be used for purifying sewage water are common reed, bulbush, water hyacinth, duck weeds, *Hydrilla* sp. etc.

Increasing the productivity and improving the status of small scale farmers are the two major challenges facing the developing countries of the world. The importance

of aquatic macrophytes is emphasized in this regard. There is a need to quantify aquatic macrophytes, fresh as well processed as fish pond inputs, human foods, livestock feed, bio fertilizers, energy resources, raw materials for pulp, paper and fibre.

2.3 CHEMICAL COMPOSITION OF MACROPHYTES

The chemical composition of the aquatic plant species is related to the environment in which it grows. Aquatic macrophytes have a high water content (80-90%) in general which is usually a major deterrent to their harvest and utilisation. The dry matter content is very low, generally from 5-15%. Aquatic weeds generally contain 10-26% of crude protein on dry matter basis. The amount of minerals varies from 8-60% on dry weight basis. The amounts of phosphorus, magnesium, sodium, copper and zinc in aquatic weeds growing in nature are quite similar to those in terrestrial plants. However, aquatic plants are often richer in iron, calcium and potassium than land plants. Some aquatic plants have carotene and xanthophyll pigments, which are incidentally important ingredients in poultry rations.

3.0 MACROPHYTES OF ANSUPA LAKE

Natural resources are the most valuable gifts of nature as defined by human judgement. Macrophytes grow dense in the lake. Dense beds of macrophyte include both hydrophytes and aquatic pteridophytes impede boating, fishing and swimming. Decomposed plants also release noxious odours, litter beaches and remove dissolved oxygen from the water. Young fish grow poorly in dense vegetation. Macrophytes support a diverse community of benthos, (Rosine, 1955). By intercepting run off storing nutrients and stabilizing sediments, macrophyte retard algal blooms and improve water clarity (Goulder, 1969 and Modlin, 1970). Most of the earlier studies pertaining to different aspects of macrophytes are related to lakes, ponds, rivers, reservoirs and estuaries; those were executed in the temperate as well as tropical regions of the world. The studies on different aspects of macrophyte in Ansupa lake was very meager. The dominant macrophytes (angiosperm) of Ansupa lake is *Cypperus brevifolius, Hygrophila schulli, Eichhornia crassipes, Ipomoea aquatica, Euryale ferox, Nelumbo nucifera* and *Nymphaae nouchali*. Similarly, the dominant aquatic pteridophytes are *Marsilea quadrifolia, Azolla pinnata* and *Salvinia molesta*.

3.1 MACROPHYTES OF ANSUPA: A REVIEW

Ansupa Lake is the largest fresh water lake of the state. It is a unique ecosystem with magnificent biological diversity. But very less attempt has been taken to study the uniqueness of this important freshwater habitat. As per available literature,

first study on macrophytes of the lake was carried out in early 90s. Patnaik et al. (1990) reported the presence of 37 species of macrophytes from the lake. Bhatta (2001) reported 31 species of macrophytes along with their biomass. Later, Swain et al. (2002) interpreted the macrophyte composition of the lake along with water chemistry and other physical variables. They have reported the availability of 48 species of macrophytes from the lake and shoreline area. Patra (2006) reported about 22 species of macrophytes from the same lake. Das and Mohanty (2008) reported 21 species of aquatic flora from the lake. Presence of 47 species of macrophytes was reported in the year 2014, which includes 9 species of submerged, 12 species of floating and 26 species of emergent aquatic plants (CDA, 2014). Sarkar et al. (2015) mentioned about few economically important macrophyte species of Ansupa lake. Furthermore, Panda et al. (2016) mentioned about the occurrence of 149 species of hydrophytes, among of them 75 species are dicotyledons and 74 species are monocotyledons. They have described about five vegetation categories found in this lake, those are 1. Free floating 2. Emergent 3. Submerged 4. Amphibious 5. Sedges and Grasses. Recently Panda et al. (2018) mentioned about 244 species of vascular macrophytes from in and around the lake including 182 species of semi-aquatic and 62 species of aquatic macrophytes, which shows the rich floral diversity of the lake.

Though very few studies have been done on macrophyte composition and status of the lake, but those are providing vital information about the health status of the lake over different temporal period.

3.2 TYPES OF MACROPHYTES OF ANSUPA LAKE

Broadly, the aquatic macrophytes in Ansupa lake can be represented by (i) Emergent type, (ii) Floating (rooted floating and free floating) and (iii) Submerged type.

3.2.1 Emergent macrophyte

The emergent macrophytes in Ansupa lake are found in shoreline as well as shallower region of the lake. When the lake water recedes during summer months, they can thrive with little water. Emergent macrophytes are mostly perennial higher plants growing on periodically inundated or submerged soils with their basal portions submerged in water and tops above the water level. The root system is well developed to provide strong anchorage with the substratum to withstand the wind and wave action in the shallow water area. The rhizomes and the roots spread laterally into the deeper water to adjust with the changing water levels of the lake. The dominant emergent species are *Cyperus compressus, Cyperus imbricatus, Typha angustata,*

3.2.2 Floating macrophytes

The floating macrophytes in Ansupa lake is of two types such as (a) Rooted floating and (b) Free floating. The rooted floating plants have their roots in the bottom sediment and they can float on the surface of the water. The free floating plants, float in the surface of the water and change their position with the blowing of wind, current of the water flowing from the river and wave action in the lake. The dominant rooted floating macrophytes are *Nelumbo nucifera*, *Nymphaea pubescens* and *Euryale ferox.* The free floating plants are *Eichhornia crassipes, Nymphoides indica* and *Salvinia minima*. These plants are found in the shallower part as well as deeper parts in Ansupa lake.

3.2.3 Submerged macrophytes

Submerged macrophyte vegetation of the lake is much diversified and well distributed. The species is found in the deeper region of the lake. The dominant species are *Hydrilla verticillata, Najas indica* and *Ceratophyllum demersum.*The major submerged dominant macrophyte species of Ansupa is *Hydrilla verticilata* which proliferated in the deeper region of the lake with high biomass. It impede the plying of boats for tourist purposes as well as fishing in the lake. To arrest the growth of the species in the lake, Chilika Development Authority released the yearling grass carp (*Ctenopharyngodon idella*) during the year 2019. This fish is a voracious eater which consumed macrophyte biomass, ten times of its body weight. It also feed on other species of submerged macrophytes of the lake.

4.0 SPECIES DESCRIPTION

Andrographis paniculata (Burm.f.) Wall.

Andrographis subspathulata C.B.Cl. In Hook.f.



Vernacular name:

Bhuinimbo, Chiraita (O); Chiraita (Beng.,O)

Family:

ACANTHACEAE

Botanical description:

Erect, glabrous herb, stem 4-angled. Leaves sessile or subsessile, linear-Ianceolate or lanceolate, acute, glabrous or minutely puberulous beneath. Flowers pedicelled, white-purplae or spotted purple, solitary and erect on slender, spreading, sometimes compound branches of large panicles. Capsule oblong, very sparsely gland-hairy, finally glabrous.

Distribuon:

Throughout India and Sri Lanka, Locally common in and around Ansupa.

Ecology and habitat:

Common in forests, way sides, scrub forests.

Flowering and fruiting:

September -May

Uses:

The shrub is well known as 'kalmegh'. It is a Liver tonic, hepato-protective, anthelmintic, depurative, antihistaminic, stimulant, IG-Promoter and useful in allergy, fever and skin diseases etc.



Hygrophila schulii (Buch.-Ham.) Almeida & Almeida

Hygrophila auriculata (Schum.) Heyne



Vernacular name:

Koelekha (O); Talimakhana (H); Kulia Khara (Beng.).

Family:

ACANTHACEAE

Botanical description:

Undershrub with sparsely hairy stems and whorled spines at the nodes. Leaves sessile, pseudo-whorled from the shortened axillary branchlets; leaves often 6 in a whorl, the two outer ones often larger; oblong or linear-oblong entire or minutely dentate, acute, hairy. Flowers purple, in axillary whorls. Capsule linear-oblong.

Distribution:

Found in Peninsular India and Sri Lanka, locally common in and around Ansupa .

Ecology and habitat:

Common along water courses, field bunds.

Flowering and fruiting:

October – February

Uses:

It is anti-inflammatory, aphrodisiac, liver tonic, sexual tonic, ophthalmic, diuretic and useful in dropsy of chronic, Bright's disease, ascities, hyperdipsia, jaundice, rheumatism, lumbago & anasarca etc.

Limnophyton obtusifolium (L.) Miq.



Vernacular name:

Family:

ALISMATACEAE

Botanical description:

Robust aquatic herb. Leaves broadly sagittate, reniformly- sagittate to triangular, many-nerved, pellucid-punctate. Flowers numerous, white, in whorls on the branches of a large panicle; upper whorls male, lower ones bisexual. Achenes in a globose head, obovoid, with fleshy exocarp wrinkled when dry.

Distribution:

Angola, Bangladesh, Bhutan, Cameroon, Ethiopia, Gambia, Ghana, India, Sri Lanka, Thailand and Zimbabwe etc. Locally common at Ansupa.

Ecology and habitat:

Common in fresh water tanks, ponds and marshes

Flowering and fruiting:

February-August.

Uses:

It is used as cattle feed.

Sagittaria sagittifolia L.



Vernacular name:

Muya Muya, Chhatokut(B)

Family:

ALISMATACEAE

Botanical description:

Scapigerous, aquatic, stoloniferous herb; stolen ending in a tuber. Leaves in deep running water strap-shaped, which floating with lanceolate or elliptic blade and in shallow water emerging and with a hastate or sagittate blade, 5-20 cm, usually 10-15 cm long, usually acute or acuminate, basal lobes more or less diverging, narrower and often longer than the rest of the blade and ending in a very acute, fine tip; petiole very spongy, 3-gonous. Flowers 1.2-1.8 cm diam., white with usually purple centre, sessile or shortly pedicelled, upper males with longer pedicels, eclin 3-5 whorls of 3-5 flowers, each on a scape 15 cm or more long..

Ecology and habitat:

Common seen in tanks and pools

Distribution:

Throughout India, other parts of Asia, Europe and North America

Flowering and fruiting:

Fl: July-August and
Fr: August-September

Uses:

Edible; It is antiscorbutic, diuretic. The leaf is used to treat a variety of skin problem

Sagittaria guayanensis H.B.K.

S. guayanensis sensu Hook..f.



Vernacular name:

Family:

ALISMATACEAE

Botanical description:

Scapigerous aquatic herb. Roots fibrous, densely tufted. Leaves floating, broadly ovate, apex rounded or obtuse, nerves obscure, radiating, distinct when dry, base deeply cordate. Sheaths very broad, suddenly contracted into long, often hairy petiole. Flowers white. Achenes flat, surrounded by a broad, prominently toothed wing. It is predominant tropical.

Distribution:

It is found in Mexico, Central America, West Indies, South America, West Africa south and South-East Asia.

Ecology and habitat:

Occasional, in ponds, pools, ditches; sometimes in paddy fields; also occur in Entire Ansupa.

Flowering and fruiting:

August-November.

Uses:

Useful for skin diseases.



Alternanthera paronychioides St.-Hil. Voy.



Vernacular name:

Family:

AMARANTHACEAE

Botanical description:

Prostrate perennial herb; branches villous when young. Leaves elliptic, elliptic-oblong or spathulate-oblong, narrowed into a short distinct petiole. Spikes sessile, axillary, solitary or 2-3 together; bracts white, scarious, mucronate with the excurrent midrib; tepals white, subequal, prominently 3-nerved, mucronate. Utricle compressed, orbicular-obcordate; seeds discoid, brownish, shining.

Distribution:

Serveral parts of India. Native of tropical America, Java and other parts of old world.

Ecology and habitat:

In moist grass lands close to water bodies.

Flowering and fruiting:

February-April.

Uses:

It is used in Eye diseases and fever.



Alternanthera sessilis (L.) R.Br. ex DC.



Vernacular name:

Gurundi (H), Madaranga (O)

Family:

AMARANTHACEAE

Botanical description:

Prostrate or ascending herb. Leaves sessile or subsessile, variable, elliptic-oblong, oblanceolate, obovate-oblong, narrowly elliptic or linear, glabrous or slightly hairy on both sides. Cluster of flowers or spikes axillary, solitary or few in a cluster, white or pinkish; bracts scarious, white ovate, mucronate, glabrous. Seeds discoid.

Distribution:

Sri Lanka and other Asian Countries also throughout India. Locally common at Ansupa.

Ecology and habitat:

Very common in moist waste places, banks of lakes and ponds, rice fields.

Flowering and fruiting:

July-December

Uses:

Constipating, depurative, digestive, antidiarrheal, febrifuge. Useful in fever, burning sensation, leprosy and other skin diseases.



Amaranthus spinosus L.



Vernacular name:

Kanta khada (O); Kanta-leutia (Beng.); Prickly Amaranth (E).

Family:

AMARANTHACEAE

Botanical description:

Erect glabrous branched herb, armed with sharp axillary spines; spines very sharp, paired or clustered. Leaves ovate, lanceolate or rhomboid, margin entire, waved, apex acute or subacute. Flowers green, in axillary clusters, tepals 5, with green midrib and scarious margins. Utricle ovoid, circumscissile. Seeds dark brown or black.

Distribution:

Throughout India and other warmer regions of the world. Locally common at Ansupa.

Ecology and habitat:

Common near swamps, water bodies and rice fields.

Flowering and fruiting:

Most of the year.

Uses:

Appetizer, diuretic and useful in burning Sensations, hyperdipsia, Leprosy, eczema, nausea and fever etc.

Amaranthus viridis Linn.



Vernacular name:

Leutia, Leutia saga (O); Jangli chaulai (H); Ban note (Beng.); Green or wild amaranth (E).

Family:

AMARANTHACEAE

Botanical description:

Erect or procumbent herb, green and glabrous. Leaves ovate, rhomboid-ovate or rhomboid, acute, sub-acute or obtuse, often emarginate. Flowers minute, in panicled spikes; bracts and bracteoles ovate-Ianceolate, midrib minutely excurrent; tepals usually 3, linear to oblanceolate or oblong-Ianceolate. Utricle rugose, acute, indehiscent.

Distribution:

Throughout India, common in tropical and subtropical regions of the world locally common at Ansupa.

Ecology and habitat:

A common weed of open grassy places and cultivated fields.

Flowering and fruiting:

Throughout the year.

Uses:

The tender parts are cooked and used in Snake-bite and Scorpion- sting.



Celosia argentea L.



Vernacular name:

Nahanga saga (O); Safaid murgha (H); Swetmurga (Beng.); Quail Grass (E).

Family:

AMARANTHACEAE

Botanical description:

Erect, glabrous herb. Stems and branches striate. Leaves lanceolate, linear or lanceolate-oblong, acute to acuminate, base cuneate or tapering into slender petiole. Spikes shining pink or white, peduncled, ovoid or cylindrical; tepals linear-lanceolate, very searlous, acute; bracts and bracteoles similar but smaller, often aristulate. Utricle ellipsoid. Seeds several, black, shining.

Distribution:

Throughout India, Tropical Asia, Africa and America locally common at Ansupa.

Ecology and habitat:

Common weed in and around cultivated fields and waysides.

Flowering and fruiting:

August-January.

Uses:

The tender leaves and young parts are boiled and take as vegetable. Seeds are used in diarrhea.



Gomphrena celosioides Mart.



Vernacular name:

Family:

AMARANTHACEAE

Botanical description:

Annual prostrate or ascending herb. Stem and branches striate, white villous. Leaves sessile or subsessile, narrowly oblong to oblong-elliptic or oblanceolate, villous. Spikes first globose and finally elongate and cylindrical, white, subtended by a pair of sessile leaves. Utricle compressed-pyriform; Seeds brown, shining.

Distribution:

Native of S. America distributed in other warmer regions of the world. Found in Many parts of India, Locally common at Ansupa

Ecology and habitat:

Common weed in wastelands in rainy season.

Flowering and fruiting:

Most part of the year.

Uses:

Root is chewed daily before sleep at night to cure pyorrhea.



Centella asiatica (L.) Urban

Hydrocotyle asiatica L.



Vernacular name:

Thalkuri, Thalkudi (O); Brahma manduki, Brahmi (H).

Family:

APIACEAE

Botanical description:

Herbs with long creeping stem, rooting at the nodes. Leaves several from the rootstock, orbicular-reniform, base cordate, shallowly crenate, glabrous, with several slender nerves from cordate base. Flowers 3-5, rarely 6 in an umbel, subsessile, petals red, ovate, acute or obtuse, imbricate. Fruit orbicular to ellipsoid.

Distribution:

Common in All over India and other Asian Countries common at Ansupa.

Ecology and habitat:

Found in wet places and low lying rice fields.

Flowering and fruiting:

Most part of the year.

Uses:

The leaf juice is used for treatment of stomach disorders and memory enhancement. Useful in Skin diseases, Ulcerations, eczema, psoriasis, leprosy, malaria,fevers and rheumatism etc.



Aponogeton natans (L.) Engl. & Krause

Aponogeton monostachyon Linn.



Vernacular name:

Ghechu, Jhechu (H), Kesurkanda (O)

Family:

APONOGETONACEAE

Botanical description:

Perennial aquatic plant with elongate tubers. Submerged leaves lanceolate, base and apex cuneate, tip blunt, midrib wide, with 2 or 3 parallel nerves on either side; floating leaves oblong, rarely linear-oblong, obtuse or acute, 3-7 nerved, base rounded, cordate or cunete. Spike solitary, densely flowered, cylindric. Flowers bluish, pinkish or purplish. Fruits smooth with a long terminal beak.

Distribution:

It is found in India, Sri Lanka, Bangladesh and Myanmar. Locally common at Ansupa.

Ecology and habitat:

Fairly common in stagnant shallow waters, rice fields, ponds, ditches and margins of lakes.

Flowering and fruiting:

September-November

Uses:

Three grams of fresh tuber are ground into a paste and boiled with 200 ml. of coconut oil and applied on hair before bath for three days to get rid of dandruff. The bulbils are eaten by locals.

Colocasia esculenta (L.) Schott in Schoot & Endl.

Colocasia antiquorum Schott



Vernacular name:

Saru, Bansaru (O); Kachhu (Beng.); Kachu (H,Beng.); Arvi, Kachalu, Ghuiya (H); Cocoyam (E).

Family:

ARACEAE

Botanical description:

Tuberous herb; sometimes with stolons. Leaves ovate, subtriangular or suborbicular, cordate, peltate, basal sinus triangular, margin often undulate; petiole stout, green or violet. Spathe peduncled, yellow, convolute, never widely open, curved slightly backwards in flower. Spadix much shorter than the spathe; male and female flowers with interposed neuters. Berries obconic.

Distribution:

Native to South East Asia but cultivated in many parts of the world. Locally common at Ansupa.

Ecology and habitat:

Locally gregarious in damp and shady places, field bunds; widely cultivated for the edible tubers.

Flowering and fruiting:

June-November.

Uses:

Different cultivars are cultivated for the edible tubers.



Pistia stratiotes L.



Vernacular name:

Borajhanji (O); Takapana (H,Beng.); Water lettuce, Tropical Duck weed (E).

Family:

ARACEAE

Botanical description:

Gregarious floating cabbage-like herb. Leaves obovate-cuneate, long, very variable in breadth, rounded, retuse or shallowly lobulate and undulate at apex, densely closely pubescent on both sides. Spathe pale yellow or white, long, obliquely campanulate, contracted near the middle.

Distribution:

Many parts of Asia, Africa and America. Throughout India. Locally common at Ansupa.

Ecology and habitat:

Common in ponds and stagnant waters.

Flowering and fruiting:

Fl: May-June
Fr: November- December.

Uses:

The plant is made to compost for field application. Used in Skindiseases leprosy and eczema. Eaten by ducks.



Ageratum conyzoides L.



Vernacular name:

Poksunga (O); Uchunti, Dochunty (Beng.); Goat weed (E).

Family:

ASTERACEAE

Botanical description:

Erect hispidly hairy herb. Leaves petioled, ovate, coarsely crenate, acute, hairy. Heads white or blue-purple. Involucre campanulate; bracts oblong, lanceolate, serrulate towards apex, acute. Achenes black, slightly curved.

Distribution:

Native to Tropical America, but consider as invasive weed in many other regions of the world. Locally common at Ansupa.

Ecology and habitat:

Common in moist and shady areas all through.

Flowering and fruiting:

All the year round.

Uses:

Used in dysentery and diarrhea.



Eclipta prostrata (L.) L.

Eclipta alba (L.) Hassk.



Vernacular name:

Kesatura, Kesarda, Bhrungaraj (O); Bhangra (H); Kesoti, Keshori (Beng.).

Family:

ASTERACEAE

Botanical description:

Erect or prostrate herb, much branched, hispid or hirsute all over. Leaves usually oblong or elliptic, subentire or toothed, acute or acuminate. Heads subglobose, white with long peduncle. Involucral bracts ovate, strigose, 1-3 nerved. Outer florets with narrow, white ligule; disc floret campanulate. Achenes 2-edged, verrucose.

Distribution:

Widespread across the world. Locally common at Ansupa

Ecology and habitat:

Frequent in moist places, ditches, rice fields and waste places.

Flowering and fruiting:

August- December.

Uses:

Powder of the dried root with honey used for recovery of memory loss. The leaf juice is used to dye hair. Used in enlarged liver, spleen and dropsy.



Enydra fluctuans Lour.



Vernacular name:

Madhurango, Hidimichi (O); Hingch (Beng.); Harakuch (H).

Family:

ASTERACEAE

Botanical description:

Prostrate herb, rooting at the nodes; stems succulent, with short ascending flowering hairy branches. Leaves narrowly oblong, long, serrate, punctate beneath. Heads yellow, terminal and axillary, sessile. Involucral bracts greenish yellow. Corolla of ray florets 3-lobed to one side.

Distribution:

Many parts of India like Bengal, Assam, Odisha etc. Locally common at Ansupa.

Ecology and habitat:

Occasional in wet places along river beds, ponds, swamps etc.

Flowering and fruiting:

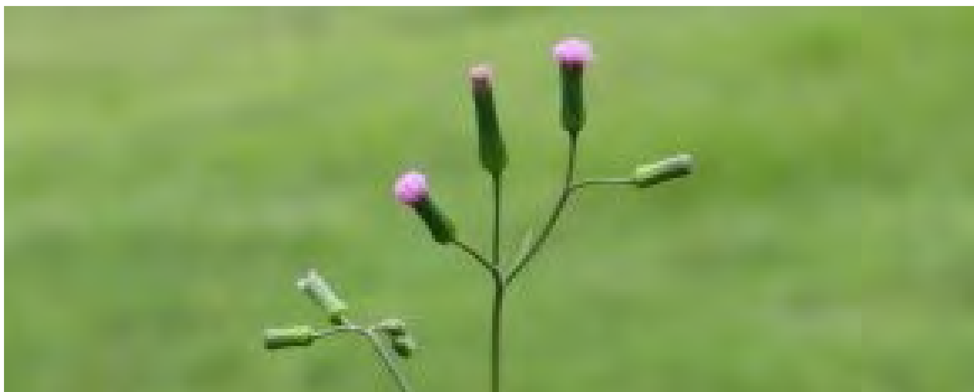
December- February.

Uses:

The leaves and tender parts are cooked and taken as green vegetables. Leaves are useful in the torpidity of the Liver, skin and nervous system related diseases.



Emilia sonchifolia (L.) DC



Vernacular name:

Sarkara (O); Sadi modi, Sadhi modi (Beng.); Heran Khuri (H) .

Family:

ASTERACEAE

Botanical description:

Glabrous or glabrescent, erect, rarely diffuse herb;stems sometimes sparsely hairy at base. Lower leavess lyrate and usually pinnatifid, long; upper cauline leaves few, lanceolate or oblong-Ianceolate, with large auricles. Heads pink or purple, narrow cylindric, ca. long. Involucre tubular, 8-10-toothed, only splitting into its component bracts in fruits. Florets rose, scarcely longer than the involucre. Achenes long, nearly uniform in width throughout, with 5 scabrid ribs.

Distribution:

Native to china, India and South east Asia. Also found in Africa, Australia, America. Locally common at Ansupa.

Ecology and habitat:

Common in moist and shady places.

Flowering and fruiting:

August-April.

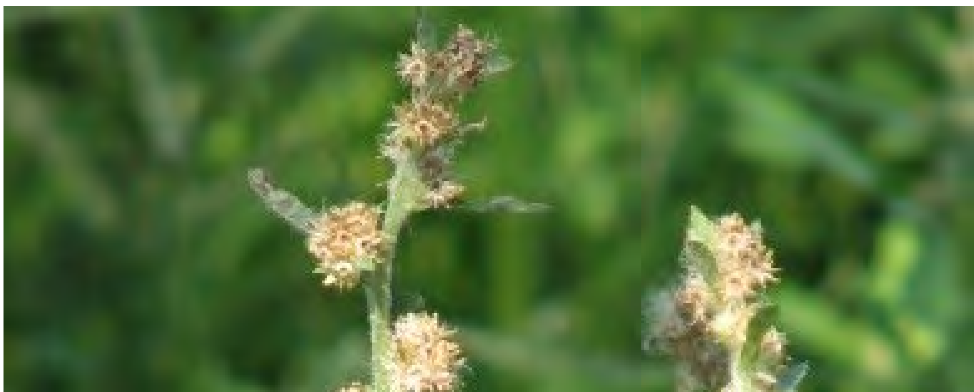
Uses:

Useful in fever, diarrhea, eczema and used as an antidote for snake bites.



Gnaphalium polycaulon Pers.

G. indicum auct. non L.



Vernacular name:

Family:

ASTERACEAE

Botanical description:

Woolly or softly cottony herb; stems many, spreading from the base or the central one erect, 10-20 cm long. Leaves narrowly oblong or linear- obovate or spathulate, long, apiculate. Heads long or less in axillary clusters from the upper leaves and forming terminal spikes. Involucral bracts erect linear-oblong or outer ovate-Ianceolate, acute or obtuse, usually green below and shining yellow-brown above, longer ones. Corollas of bisexual florets. Achenes minutely hispidulous; pappus hairs free.

Distribution:

widespread across America, Asia and Africa

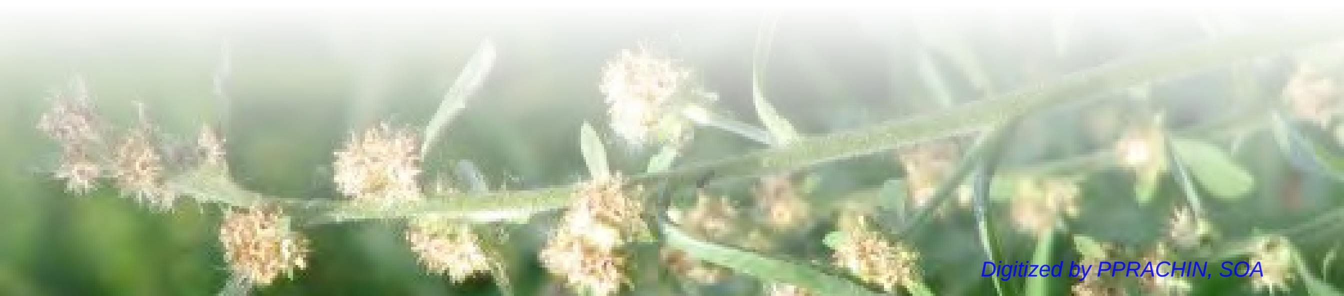
Ecology and habitat:

Very common in wet places under heavy shade throughout the area.

Flowering and fruiting:

January-April.

Uses:



Grangea maderaspatana (L.) Poir.



Vernacular name:

Agnikumari, Painjari (O); Namati (Beng.); Mastaru, Mukha tari (H)

Family:

ASTERACEAE

Botanical description:

Procumbent herb; branches villous or hirsute. Leaves oblong, pinnatifid or lobulate, villous. Heads globose, shortly peduncled, yellow; outer florets very slender with long exserted style, inner usually with 4-lobed cololla. Achenes stipitate, palebrown; pappus cupular with a ring of short hairs.

Distribution:

It is widely distributed throughout India and Nepal.

Ecology and habitat:

A mat forming species in moist localities; common weed in crop fields after harvest.

Flowering and fruiting:

January-April.

Uses:

Root is chewed after meal against dyspepsia. It has antispasmodic properties.



Sphaeranthus indicus L.



Vernacular name:

Bhuin kadamba, Gurak mundi, Halamundi (O); Mundi (O).

Family:

ASTERACEAE

Botanical description:

Aromatic glandular and pilose herb. Stems winged, wings irregularly toothed. Leaves sessile or semi-amplexicaul, obovate or oblanceolate, serrate-dentate, sometimes spinulose-dentate, pilose on both sides. Clusters of heads terminal and leaf-opposed, purple, spherical. Peduncles with crisped or toothed wings.

Distribution:

Found across India, Sri Lanka, Africa and Australia. Locally common at Ansupa.

Ecology and habitat:

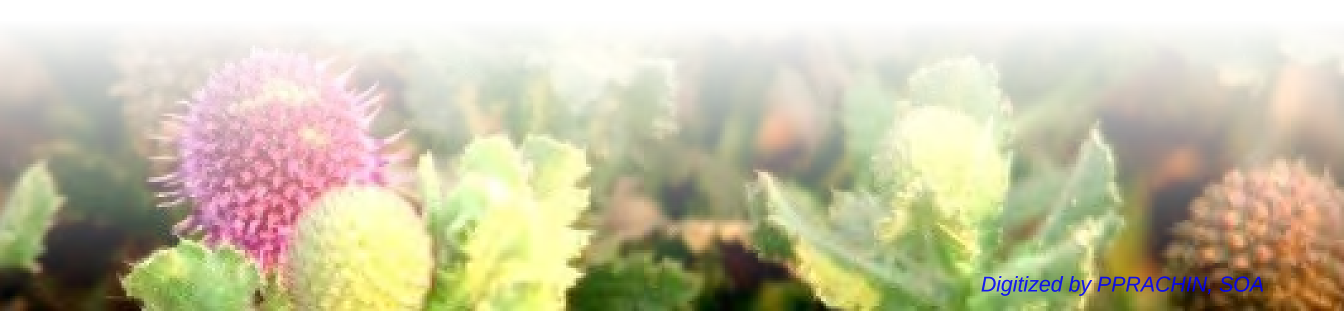
Common in wet harvested rice fields and moist localities; often forming gregarious colonies.

Flowering and fruiting:

November-March.

Uses:

Used for epilepsy, mental illness, jaundice, hepatopathy, diabetes, leprosy, fever, cough and skin diseases etc.



Spilanthes paniculata Wall.

S.acmella var. paniculata (DC.) C.B.Cl.



Vernacular name:

Family:

ASTERACEAE

Botanical description:

Erect herb, sometimes rooting at the nodes. Stems glabrous or sparsely pubescent. Leaves ovate or broadly ovate, serrat, acute, base decurrent on petioles. Heads ovoid or ovoid-conical, elongating in fruit. Involucral bracts 2-seriate, elliptic-lanceolate. Achenes narrowly obovate, strongly ciliate on the margins; pappus bristles 1-2, weak.

Distribution:

Found in tropical and sub-tropical countries like India and South America.

Ecology and habitat:

Common in moist sandy soil.

Flowering and fruiting:

October-February.

Uses:

Reduced the pain associated with toothaches and can induce saliva secretions



Xanthium indicum Koenig in Roxb.

Xanthium strumarium L



Vernacular name:

Bada Gokhara, Bila Gokhara (O).

Family:

ASTERACEAE

Botanical description:

Annual erect herb. Stems closely hispidulous. Leaves long petioled, ovate-triangular, coarsely lobed and toothed, scabrid and hispid, base often cordate and 3-nerved. Female involucres burr-like, closely covered with hooked spines; male heads at the top of the inflorescence or stem, with prominent exserted anthers. Achenes of female florets enclosed in hardened cells of the urticle.

Distribution:

Probably originates from North America but treated as invasive weed in other parts of the world. Common at Ansupa

Ecology and habitat:

Fairly common weed in waste places, crop fields; often making big colonies.

Flowering and fruiting:

Throughout the year.

Uses:

Leaf extract is used to cure chronic disease of sheep and goat.

Coldenia procumbens L.



Vernacular name:

Hansapadi, Gandharilata (O).

Family:

BORAGINACEAE

Botanical description:

Prostrate, scabrid hairy herb. Leaves obovate, elliptic-obovate, coarsely serrate or lobulate, apex obtuse or rounded, densely scabrous or hispid above, sometimes white-glandular-pubescent. Flowers white, very small. Drupe pyramidal, tipped with the hardened bipartite style.

Distribution:

Founded across the tropical and sub-tropical Africa, Asia and Australia. Locally common at Ansupa.

Ecology and habitat:

Common weed in cultivated land, wastelands with moist soil.

Flowering and fruiting:

Most part of the year.

Uses:

Useful in rheumatic swellings and other kind of swollen knees and joints. Leaves are used for treatment of tumours.



Heliotropium indicum L.



Vernacular name:

Hatisundha (O); Hati sura (O,Beng.,H); Hattasura, Sirari (H).

Family:

BORAGINACEAE

Botanical description:

Erect, coarse hispid annual herb. Leaves alternate, sometimes sub-opposite, ovate or ovate-oblong, margin undulate, apex acute or obtuse, rugose above with a few hairs, hairy beneath, secondary nerves strong beneath. Flowers white or lilac, in elongate, simple, ebracteate, often circinate spikes, nutlets in pairs.

Distribution:

A native plant to Asia. Locally common at Ansupa.

Ecology and habitat:

Common in waste places and sandy shores.

Flowering and fruiting:

Most part of the year.

Uses:

Extracted juice from the pounded leaves of the plants is used in wounds and skin ulcers.



Cleome monophylla L



Vernacular name:

Rango sorisho (O); Chamani (K); Kedar jhamar, Harhara (S); Hulhulia (Kondh); Hurhuria (Bondo).

Family:

CAPPARACEAE

Botanical description:

Erect branched, glandular-pubescent or hispid herb. Leaves simple, oblong, oblong-lanceolate, ovate-lanceolate, base truncate, apex acute. Flowers pink or purplish, in the axils of leafy bracts. Capsule linear, strongly ribbed, ribs glandular-hairy.

Distribution:

Throughout tropical Africa- Mauritania to Somalia and South Africa. Arabian Peninsula to India.

Ecology and habitat:

Occasional in waste lands, weed in cultivated pulse fields.

Flowering and fruiting:

Fl: February-June,
Fr: August-December

Uses:

It is used in ulcers, boils and wounds which prevents formation of pus, prevents swellings, useful in headache and fever.



Cleome viscosa L.

Polanisia icosandra Wight & Arn.



Vernacular name:

Banosorisho, Anasorisho (O); Hurhur, Hulhul (H); Hurhuria (Beng.);

Family:

CAPPARACEAE

Botanical description:

Erect, annual, glandular-pubescent, herb. Leaves 3-5-foliolate; leaflets subsessile, shortly petiolulate, obovate or elliptic, the middle one larger than the lateral ones. Racemes corymbose. Flowers yellow, long pedicelled, in the axils of reduced leaves. Capsule terete, ribs oblique, glandular hairy. Seeds many.

Distribution:

It is a pantropical plant. Mainly found in Asia, Africa, North America, Central America, South America, Locally common at Ansupa.

Ecology and habitat:

Common in crop fields and along roads.

Flowering and fruiting:

May-October

Uses:

Used as an external application to wound and ulcers. Juice of the leaves has been used to relieve earache.



Polycarpon prostratum (Forssk.) Asch. &Schweinf

Polycarpon loeflingiae (Wight &Arn.) Benth. &Hook



Vernacular name:

Ghima (Beng.); Sureta (H).

Family:

CARYOPHYLLACEAE

Botanical description:

Prostrate or diffuse herb; branches, puberulous to pubescent. Leaves subsessile, oblong, oblanceolate or spathulate,subacute to obtuse, chartaceous, puberulous. Bracts scarious and sessile. Flowers white, sessile or very shortly pedicelled. Sepals ovate-oblong or oblong, subequal, subacute. Petals hyaline, broadly oblong, shorter than the sepals, obtuse. Capsule ovoid or globose. Seeds long.

Distribution:

Tropical regions of Asia and Africa.

Ecology and habitat:

Common in damp places near ponds, river banks and water courses.

Flowering and fruiting:

November-May

Uses:



Ceratophyllum demersum Linn.



Vernacular name:

Chingudia dala (O), Sivara (H)

Family:

CERATOPHYLLACEAE

Botanical description:

Submerged slender aquatic herb, densely leafy. Leaves whorled, mostly 2-times forked; segments filiform, denticulate on outer edges. Flowers minute, axillary; male and female flowers in separate axils. Nut pedicelled, ellipsoid, appendaged.

Distribution:

Found in all over the world except Antarctica. Locally common at Ansupa.

Ecology and habitat:

A submerged aquatic plant

Flowering and fruiting:

January-March

Uses:

Used as fish feed.



Gloriosa superba L.



Vernacular name:

Ognisikha, Meheria phulo, Karihari, Dasara phulo,Durga phulo, Na Nangalia (O); Bisha languli, Ulat chandal, Kariari (Beng.); Languli, Kulhari, Kaliari (H); Mllbar glory Lily (E).

Family:

LILIACEAE

Botanical description:

Climbing or usually scrambling, glabrous herb, with tuberous rootstock. Leaves sessile or subsessile,lanceolate or linear to ovate-Ianceolate, apex circinate, finely parallel nerved. Flowers solitary axilary on reflexed pedicels; pedicels rather stout. Tepals linear, beautifully waved and crisped, lower half yellow, upper half red, finally the whole turning more or less red. Fruit oblong.

Distribution:

Tropical South Africa, Madagascar, India to Indo-china and Malaysia.

Ecology and habitat:

Occasional, among bushes and hedges in rainy season.

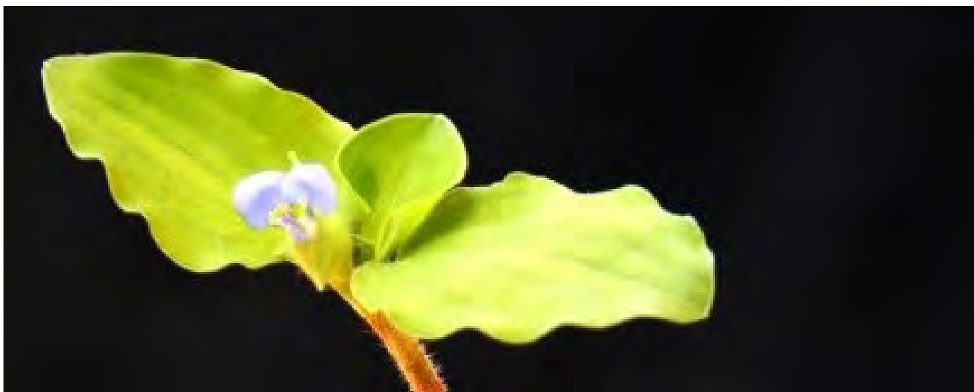
Flowering and fruiting:

Fl: September-November,
Fr: November- December

Uses:

Useful for open wounds, snakebites, ulcers, arthritis, cholera, kidney problems, itching, leprosy, small pox etc.

Commelina benghalensis L.



Vernacular name:

Kaniseera (O); Kanchira, Kanchara (Beng.,H).

Family:

COMMELINACEAE

Botanical description:

Diffuse, branched, subsucculent herb; stem often creeping and rooting below, glabrous or pubescent. Leaves ovate, elliptic-ovate, oblong or suborbicular, often inequilateral, obtuse, acute or rounded at the tip, pubescent or villous, base rounded or suddenly contracted into a petiole; sheaths pubescent or villous or both and usually with long hairs at mouth.Flowers small, blue; ovoid. Capsule membranous, pyriform. Seeds rugose, closely pitted.

Distribution:

Found in Sub-Saharan Africa. India Sri Lanka & South East-Asia Locally common at Ansupa.

Ecology and habitat:

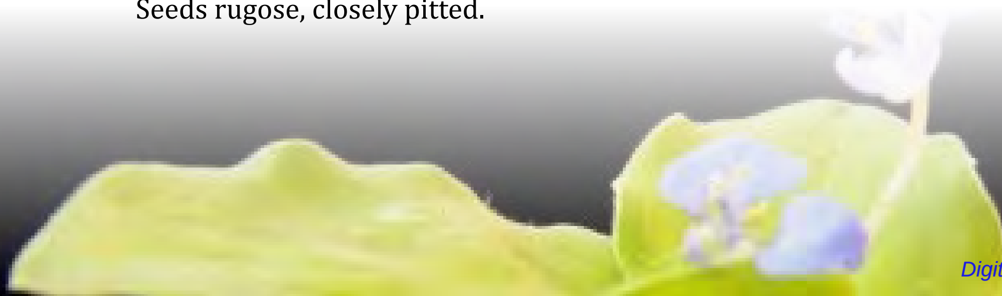
Common in moist waste places and along water bodies.

Flowering and fruiting:

July-January

Uses:

Edible, use to cure inflammations of skins as well as leprosy.



Commelina erecta L.

C.kurzii C.B.Cl.



Vernacular name:

Konisir, Kanyari (O).

Family:

COMMELINACEAE

Botanical description:

Stem hairy or glabrate. Leaves lanceolate-oblong or narrowly lanceolate, acute to acuminate, hoary-pubescent, puberulous, hirsute; sheaths long, hoary-pubescent or ciliate. Spathes sessile or nearly so, solitary or clustered, long and broad, cucullate, acute, recurved, broadly cordate, pubescent or glabrous. Capsule 3- celled, the dorsal cell indehiscent, deciduous and scabrid.

Distribution:

Found in America Africa and Asia.

Ecology and habitat:

Common in forests and moist and shady places.

Flowering and fruiting:

August-December.

Uses:

Useful for the treatments of wounds and spider bites to bring relief.v



Commelina longifolia Lam.

C.salicifolia Roxb.



Vernacular name:

Birkana arak (S); Panikanchira (Bcng.); Jal pipari (H).

Family:

COMMELINACEAE

Botanical description:

Decumbent herb. Stem slender, internodes long. Leaves sessile, linear or linear-lanceolate, glabrous or a little hispid; sheaths ciliolate. Spathes peduncled, axillary, solitary, complicate, lanceolate or ovate, long, acute, acuminate or long and finely or subobtusely caudate-acuminate, base rounded, more or less cordate. Flowers blue, small, 1-2 on the equal, considerably exserted cyme branches. Capsule oblong, shortly suddenly acute, 2-seeded.

Distribution:

Found in Indo-Malaysian Region

Ecology and habitat:

Common in swamps, ditches and along water bodies.

Flowering and fruiting:

October-March

Uses:

Beneficial in leprosy, diarrhea, Stomach disorder etc.



Tonningia axillaris (L.) Kuntze

Cyanotis axillaris (L.) Schult. & Schult.f.



Vernacular name:

Soltraj, Baghanulla (H); Gola gandi (T).

Family:

COMMELINACEAE

Botanical description:

Sub-erect or prostrate herb, creeping at base, subsucculent. Stem glabrous or sparsely hairy. Leaves linear, acuminate, glabrous or sparsely hairy, somewhat fleshy; sheaths short, inflated, glabrous or mouth ciliate. Cymes reduced to axillary fascicles enclosed in leaf-sheaths. Flowers blue, 1-6 in each axil; bracteoles linear-lanceolate, almost hidden, glabrous or minutely ciliate. Capsule glabrous, acute, 6-toothed or lobed.

Distribution:

It is native to Indian subcontinent, Southern china, South-East Asia and Northern Australia. Locally common at Ansupa.

Ecology and habitat:

Abundant in wet places, rice fields, along ponds, lakes and canals; also found on dilapidated walls and buildings.

Flowering and fruiting:

July-Jan.

Uses:

Useful in boils and ascites. It is used as cattle feed.



Evolvulus nummularius (L.)



Vernacular name:

Bichhamalia(O)

Family:

CONVOLVULACEAE

Botanical description:

Prostrate or procumbent herb with trailing branches often rooting at nodes. Leaves orbicular broadly ovate, rounded at apex, glabrous. Flowers white, solitary, axillary, corolla funnel-shaped, very thinly pubescent outside. Capsule subglobose, 2-seeded.

Distribution:

It is native to North and South America and naturalized in Asia and Africa found many parts of India.

Ecology and habitat:

Common in moist places, open fields.

Flowering and fruiting:

July-Nov.

Uses:

Antibacterial helpful in wound healing. Leaf extract is used in leprosy and rheumatism.



Murdannia spirata (L.) Brueck.

Aneilema spiratum R.Br.



Vernacular name:

Family:

COMMELINACEAE

Botanical description:

Procumbent or ascending, much-branched slender herb; roots fibrous. Leaves sessile or amplexicaul, oblong or ovate-oblong, acute or subacute, glabrous, margins thickened; sheaths short, with pubescent edges. Flowers small, violet or blue, in axillary and terminal panicles scorpioid cymes with zigzag rachis. Capsule oblong, trigonous, seeds 3-7 and 1-seriate in each cell.

Distribution:

Tropical plant species native to China, India and South-East Asia.

Ecology and habitat:

A common weed in sandy moist places and margins of water bodies.

Flowering and fruiting:

September-December

Uses:

Ipomoea aquatica Forsk.

Ipomoea reptans Poir.



Vernacular name:

Kalama, Kalama saga (O); Kalami (H, Beng.); Swamp Cabbage (E).

Family:

CONVOLVULACEAE

Botanical description:

Aquatic or semi-aquatic herb. Stems mostly thick, fistular or spongy, rooting at the nodes trailing on moist mud or floating on water. Leaves ovate-triangular, ovate-oblong, lanceolate, elliptic-oblong or ovate, glabrous, hastate or cordate. Flowers pink, purple or rarely white, axillary, solitary or in 2-3 flowered peduncled cymes. Capsule ovoid.

Distribution:

It's a tropical plant native to South-East Asia.

Ecology and habitat:

Gregarious as a floating plant in lakes, ponds and ditches; also in muddy places and rice fields.

Flowering and fruiting:

November-February.

Uses:

The leaves are used as a leafy vegetable. Juice of leves consider to purify blood. Used as antidor to counteact the poisonous action of opium and arsenic.



Ipomoea carnea Jacq. ssp. fistulosa (Mart.ex Choisy) Austin

Ipomoea fistulosa Mart. ex Choisy



Vernacular name:

Amari, Gachha Kalama (O).

Family:

CONVOLVULACEAE

Botanical description:

Shrub, erect or ascending; branches thick, fistulose or solid with milky sap. Leaves ovate or ovate-oblong, acuminate, glabrous or puberulous. Flowers funnel-shaped, purple or dark purple towards the base; calyx with nectaries between the sepal-bases; corolla tube puberulous. Fruits ovoid, 4-valved, with persistent calyx.

Distribution:

Native to tropics of South-America also found in Asia, Africa and North America.

Ecology and habitat:

Very common and gregarious in shallow water bodies, banks of lakes, ponds, canals, moist places and road sides; usually grown as a hedge plant.

Flowering and fruiting:

All the year round.

Uses:

Latex of the plant is used to treat skin problems.



Ipomoea pes-tigridis L.



Vernacular name:

Bileipada, Bileipanjha (O); Languli lata (Beng.).

Family:

CONVOLVULACEAE

Botanical description:

Herbaceous twiner, fulvous hairy or hirsute with patent hairs all over. Leaves orbicular, hairy with appressed or patent hairs, deeply lobed. Flowers in long peduncled heads, with large persistent bracts; corolla white or light pink, funnel-shaped with spreading limb. Capsule ovoid, papery, glabrous.

Distribution:

Found in Asia, Australia and other parts of the pacific

Ecology and habitat:

Quite gregarious in open waste places, agricultural fields and forests during post-monsoon periods.

Flowering and fruiting:

August-December

Uses:

Used as an antidote to dog bites, boils carbuncles. Legs are applied as poultice for boils, carbuncles and sores.



Kyllinga odorata Vahl.



Vernacular name:

Family:

CYPERACEAE

Botanical description:

Perennial with very short rhizome; stolons 0; stems tufted, triquetrous, smooth, 10-30 cm. Leaves flat, usually shorter than the stems, scabrid on the margins in the upper part. 2-4 mm wide. Inflorescence capitates, whitish, finally straw-coloured, consisting of a terminal cylindrical head, 7.5-15 x 4-5 mm and 0-2 lateral subglobose sessile heads much smaller than the terminal one; involucral bracts usually 2-3, finally reflexed, up to 10 cm. Spikelets numerous, elliptic, 2.5-4.2 mm long, compressed, maturing 1 nut, falling off as a whole; rachilla cylindrical, disarticulating at the base. Glumes hyaline, first and second small, third and fourth nearly equal in length, ovate, 2-2.5 mm long, with smooth or hardly spinulose, sharp keel, scarcely excurrent, respectively 9-11- and 5-7-nerved. Stamens 2. Stigmas 3. Nut biconvex, laterally compressed, obovate, 1.5 x 1 mm, obtuse or truncate, shortly apiculate, ultimately black.

Ecology and habitat:

In damp places

Distribution:

Widely scattered in India; tropical Himalaya; Bihar; Nilagiri. Tropical Africa; SE. Asia.

Flowering and fruiting:

June – Feb.

Uses:

Cyperus compressus L.



Vernacular name:

Chancha (Beng.).

Family:

CYPERACEAE

Botanical description:

Annual herb; stems tufted, erect and diffuse, triquetrous. Leaves longer than the stems, rigid. Spikelets 3-many, in a simple terminal head or short spike or heads; involucral bracts 3-5, patent. Spikelets oblong to linear, much compressed, rachilla flexuous, persistent. Glumes more than half imbricate, ovate, chartaceous, strongly keeled, Nut. triquetrous or trigonous, obovoid-ellipsoid, shining brown or black.

Distribution:

It is found in tropical areas of Africa, Asia and Americas.

Ecology and habitat:

Frequent in moist grassy lands, waste places and cultivated lands.

Flowering and fruiting:

July-December

Uses:



Cyperus imbricatus Retz

Cyperus radiatus Vahl



Vernacular name:

Family:

CYPERACEAE

Botanical description:

Perennial herb with very short rhizome. Stem robust, tufted, trigonous, upto 60 cm. Leaves about two-third as long as stem, canaliculated, scabrous on the margins, lower sheaths spongy, purplish-black. Inflorescence simple or compound; involucral bracts 3-5; primary rays 6-8, unequal. Spikes digitately arranged, cylindric, very dense; spikelets spicately arranged, oblong, imbricate. Nut ovoid to ellipsoid, trigonous, yellowish-brown.

Distribution:

Widely Spread in tropical and sub-tropical areas from Africa, through Asia to New Guinea also in the America.

Ecology and habitat:

Occasional in swamps, ditches and muddy margins of water bodies

Flowering and fruiting:

July- November

Uses:

Rhizome has Aphrodisiac property.

Cyperus iria Linn.



Vernacular name:

Suanti (O); Barachaneha, Burachucha (Beng.).

Family:

CYPERACEAE

Botanical description:

Non-rhizomatous herb; stems solitary or tufted, trigonous. Leaves basal, scabrous. Inflorescence simple or compound, loose; involucral bracts 3-5; rays many. Spikes narrow, oblong-ovoid, of 5-20 spikelets; rachis flexuous. Spikelets yellow or pale brown, spicately arranged, linear-oblong, obtuse; glumes orbiculIar-obovate, keeled, emarginate at apex. Nut as long as the subtending, glume, triquetrous or trigonous, obovoid, shining dark brown to black.

Distribution:

Found worldwide. More in Asia, Africa and America.

Ecology and habitat:

Quite common in rice fields, margins of water bodies and other wet places.

Flowering and fruiting:

August-January.

Uses:

The whole plant is used to treat rheumatism and to regulate menstruation.



Cyperus platystylis R.Br.



Vernacular name:

Family:

CYPERACEAE

Botanical description:

Stout perennial; stoloniferous; roots thick, stems solitary or subcaespitose, stout, trigonous upwards, thick at base. Leaves basal, as long as or longer than the stem, septate-nodulose; lower sheaths bladeless, strongly keeled, cinnarnomeous to purplish. Inflorescence compound, often with very numerous spikelets, depressed corymbose or semiglobose. Spikelets bright brown, digitately arranged in clusters of 3- 8. Glumes ovate or ovate oblong, obtusish, strongly 3-nerved, green back. Nut unequally trigonous, dorsally compressed, ellipsoid.

Distribution:

Found from Indo-Malaysia to Australia.

Ecology and habitat:

Locally gregarious in ponds and ditches along the coast.

Flowering and fruiting:

April-February

Uses:

Useful in fevers, digestive, system disorders, Menstruations.



Cyperus polystachyos Rottb.

P.odoratus Urban.



Vernacular name:

Family:

CYPERACEAE

Botanical description:

Tufted herb, stems trigonous. Leaves flat or canaliculate, scabrid on the margins. Inflorescence simple or compound, strongly contracted to open; involucral bracts 3-6, spreading. Spikelets 2-15 to the spike, fasciculate to divergent, linear, compressed, many-flowered; rachilla flexuous, narrowly winged. Glumes closely imbricate, elliptic-ovate. Nut oblong, subtruncate and apiculate, castaneous to black.

Distribution:

Found in tropical and subtropical regions of the world. Sometimes extended up to temperate regions.

Ecology and habitat:

Frequent in moist sandy places, often near the sea-coast and water sources.

Flowering and fruiting:

February-October

Uses:

Cyperus rotundus L.



Vernacular name:

Mutha, Motha (O, H, Beng.); Tandi, Suraj (S); Batha-bijir (M); Rote-sila (Ho); Tungamuste (T); Nut grass (E).

Family:

CYPERACEAE

Botanical description:

Perennial rhizomatous herbs; rhizomes sending long, wiry stolons ending in tubers; tubers fragrant, black. Stems slender, triquetrous. Leaves mostly radical. Inflorescence simple or compound; involucral bracts mostly 3; spikes ovoid; spikelets spicately arranged, linear, compressed. Glumes imbricate, linear-oblong, membranous, keeled, rubiginous to deep brown, 3-7-nerved. Nut trigonous, oblong-obovoid, brownish to black.

Distribution:

Found in Africa, Southern and central Europe and Southern Asia.

Ecology and habitat:

One of the most common weeds of wastelands and agricultural fields.

Flowering and fruiting:

July-December

Uses:

Useful for Gastrointestinal spasms, stomach disorders, nausea, vomiting, food poisoning, indigestions etc.



Aeschynomene aspera



Vernacular name:

Sola(O), Laugauni (H)

Family:

AESCHYNOMENE

Botanical description:

Erect perennial herb or undershrub; stem pith-like, often 2 cm or more in diam. Leaves sessile or nearly so, 7.5-15 cm long; stipules lanceolate, 7.5-8.7 mm long, with large basal auricle; leaflets 25-50 pairs, alternate or opposite, sessile, linear, 7.5-15 mm long, obtuse apiculate, 1-nerved, glabrous. Racemes corymbose, simple or branched, 2-4-flowered, 3.7-7.5 cm long, peduncles and pedicels hairy; bracts ovate, acute. Flowers yellow, 1.8 cm long; bracteoles 2, broadly ovate, acute, mucronate, ciliate. Calyx hispid, upper lip rounded, lower 3-lobed. Pods nearly straight, 3.7-7.5 x 0.7 cm, often indented on both sutures, joints 4-8, smooth or usually warted or echinate on the faces.

Ecology and habitat:

Common in ponds and lakes

Distribution:

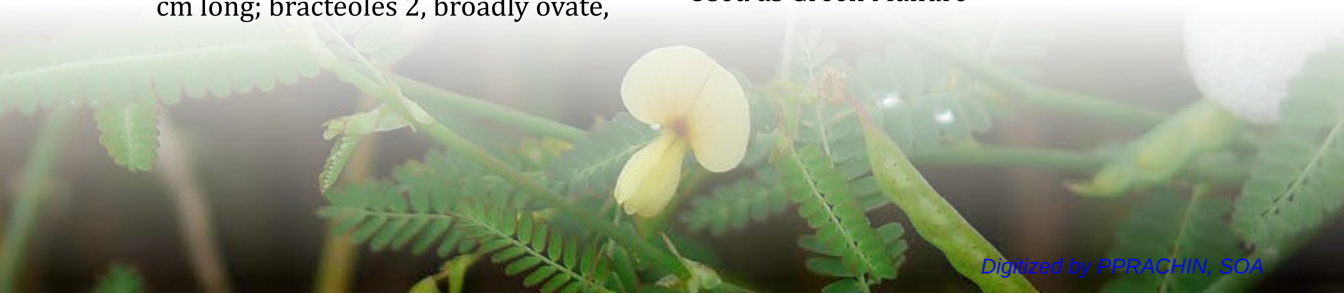
Throughout India, Sri Lanka, Myanmar, Malay Peninsula, Siam, Java

Flowering and fruiting:

Fl: August -October
Fr: November-January

Uses:

Used as Green Manure



Aeschynomene indica



Vernacular name:

sola, Pain tentuli, lajuari, Tenuteng (O)

Family:

AESCHYNOMENE

Botanical description:

Erect, slender, suffruticose annual much branched herb, 60-90 cm; branches terete, more or less scabrid with small warts on papillae. Leaves 1.8-7.5 cm long; stipules lanceolate, 5 mm including the large auricle, ciliate-toothed, deciduous; leaflets 20-30 pairs, subsessile, close set obliquely on the rachis, mostly alternate, linear-oblong, 2.5-3.7 mm long, obtuse, sometimes apiculate, glabrous, 1-nerved. Racemes lax, 1-4-flowered; bract ovate, toothed; bracteoles 2, oblong-lanceolate, often gland ciliate. Flowers yellowish, 6-9 mm long. Calyx membranous, glabrous, 4-5 mm, upperlip bifid, lower minutely 3-toothed. Standard obovate, nearly equal to wings, keel obtuse. Pods stalked, linear-oblong, slightly curved or nearly straight, 2.5-3.7 cm long, joints 5-10, smooth or Papillose.

Ecology and habitat:

Common in wet places

Distribution:

Throughout India, ascending to 1500 m in the Himalaya. Pantropic; Probably native in SE. United States

Flowering and fruiting:

July-November

Uses:

It is edible and used as raw or cooked, used as green manure and spermicides

Cassia tora L.



Vernacular name:

Chakunda, Dhola chakunda (O); Panevar (Beng.,H); Sickle pod (E).

Family:

CAESALPINIACEAE

Botanical description:

Herb or undershrub. Leaflets 3 pairs, subsessile or shortly petioluled, obovate, obtuse, rounded or retuse, increasing in size upwards, glabrous or thinly hairy; rachis with linear glands between two lowest pairs of leaflets. Flowers yellow, usually 2 on a short axillary peduncle. Pods short-stipitate, sub-terete. Seeds many, brown, oblong.

Distribution:

Found many parts of the world Abundantly found in parts of Afghanistan, India, Nigeria, China, Pakistan, Myanmar, Nepal, Bhutan and Sri Lanka etc.

Ecology and habitat:

Gregarious in open wastelands and road sides during rains.

Flowering and fruiting:

Fl: September-November,
Fr: November-December

Uses:

It is used for treating skin diseases like ring worm, itching and psoriasis.The leaves are eaten as green vegetable.



Blyxa echinosperma (C.B.Cl.) Hook.f.



Vernacular name:

Family:

HYDROCHARITACEAE

Botanical description:

Densely tufted aquatic herb. Leaves radical, sheathing at the base, very finely acuminate, with parallel nerves. Flowers bisexual, one in each spathe. Spathe long, linear, opening by a slit on one side, produced and tabular above the flower. Seeds spinescent and together with the slender tails at each end.

Distribution:

Tropical Sup-Tropical Asia to North-Australia.

Ecology and habitat:

Fairly common in stagnant and flowing water

Flowering and fruiting:

November- February

Uses:

It is used as food for both cattle and ducks. Also used as aquarium plants.

Hydrilla verticillata (Linn. F.)Royle



Vernacular name:

Bora Jhangi (O), Kureli, Jhangi (Beng., H)

Family:

HYDROCHARITACEAE

Botanical description:

Submerged, weak aquatic herbs,suspended under water. Stems slender, branched,roots fibrous. Leaves short, 3-4-nately whorled, linear or rarely narrowly elliptic,spinulose serrate, spreading,with recurved tips. Male flowers sessile at the base of each leaf. Female flowers sessile,solitary,in a cylindric spathe. Fruits subulate.

Distribution:

Native to Africa or Europe but found many lakes of the world. Locally common at Ansupa.

Ecology and habitat:

Most dominant aquatic plant of northern sector, often forming thick mat in shallow impenetrable n submerged weed

Flowering and fruiting:

October-January

Uses:

Therapeutically, plant is used to provide complete nutrition to improve digestion and gastrointestinal function, circulation neurological health, blood sugar control etc. Also used in the treatment of abscesses, boils and wounds, especially if there is debris in the wound. It is also used as manure for agricultural applications.

Ottelia alismoides (L) Pees.



Vernacular name:

Pani kundri (O); Parmikalla (Beng.).

Family:

HYDROCHARITACEAE

Botanical description:

Submerged rooted aquatic herb. Submerged leaves shortly petioled, usually narrow or oblong with tapering base; floating leaves oblong, broadly ovate, or orbicular, margin undulate, apex obtuse or rounded, 7-11-nerved, base cordate. Petals white obovate or orbicular with fleshy basal appendages. Fruit oblong crowded with withered perianth, 6-grooved.

Distribution:

Native to Africa, Asia, Australia and the pacific.

Ecology and habitat:

This species grows in still or slow-moving shallow water in northern sector of Chilika.

Flowering and fruiting:

December- January

Uses:

The fruits are edible. Leaves are anti-bacterial febrifuge etc. It is applied to the arms and legs as a poultice against fever.



Vallisneria natans (Lour.) Hara

Vallisneria spiralis auct. non Linn



Vernacular name:

Syala, Sawala, Jallil (H); Eel-grass, Tape grass (E).

Family:

HYDROCHARITACEAE

Botanical description:

Sumberged tufted herb; roots fibrous. Leaves radical, linear, ribbon shaped, size depending on the depth of water, wavy, translucent, entire or tips serrulate, apex acute. Male spathe shortly peduncled, sepals recurved. Female spathe with flowers, spathe investing the ovary alomost upto the base of the spreading sepals. Fruit linear.

Distribution:

India, Africa, North-America, Europe etc.

Ecology and habitat:

Common aquatic plant at the bottom of ponds, lakes etc.

Flowering and fruiting:

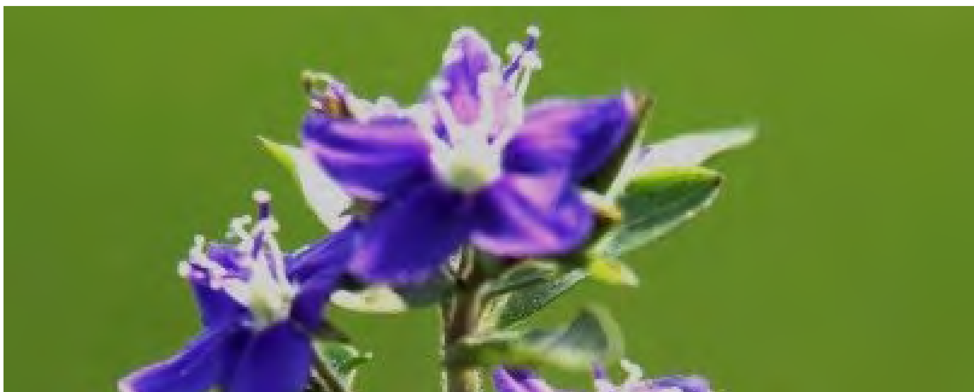
October-April.

Uses:

This is used in the treatment of Leucorrhoea. Also improve appetite. It is used as an aquarium plant.



Hydrolea zeylanica (L.) Vahl



Vernacular name:

Balluballua-kashindri, Languliya (O); Kasschra, Isha-langulia (Beng.).

Family:

HYDROPHYLLACEAE

Botanical description:

Erect or diffuse subsucculent herb, often rooting at the nodes. Leaves shortly petioled, linear, lanceolate or oblanceolate, acute or acuminate, upper gradually smaller. Inflorescence glandular-hairy or pubescent, cymose at the ends of short lateral branches and terminal. Flowers blue. Capsule ovoid- ellipsoid.

Distribution:

Tropical Africa, Tropical Himalaya, India, China and Malaysia.

Ecology and habitat:

Very common in rice field, ditches and wet places.

Flowering and fruiting:

November- April.

Uses:

Antiseptic, used for wound healing; It is used as fodder for cattle; also as a green vegetable in some areas.

Leucas aspera (Willd.) Link.



Vernacular name:

Gaiso, Gayasa (O); Chota halkusa (Beng.,H).

Family:

LAMIACEAE

Botanical description:

Erect or diffuse, much branched herb. Stems deeply grooved, thinly hairy. Leaves linear, oblanceolate, narrowly oblong, lanceolate-oblong or rarely narrowly elliptic, crenate- serrate, serrate or subentire, acute or obtuse, thinly pubescent or shortly hairy both sides. Flower white, in terminal and axillary whorls; bracts linear, hispid-ciliate; calyx mouth oblique. Nutlets smooth, brown.

Distribution:

Africa, Asia.

Ecology and habitat:

Common in pulse fields, sandy localities and bunds of rice fields.

Flowering and fruiting:

July-Jan.

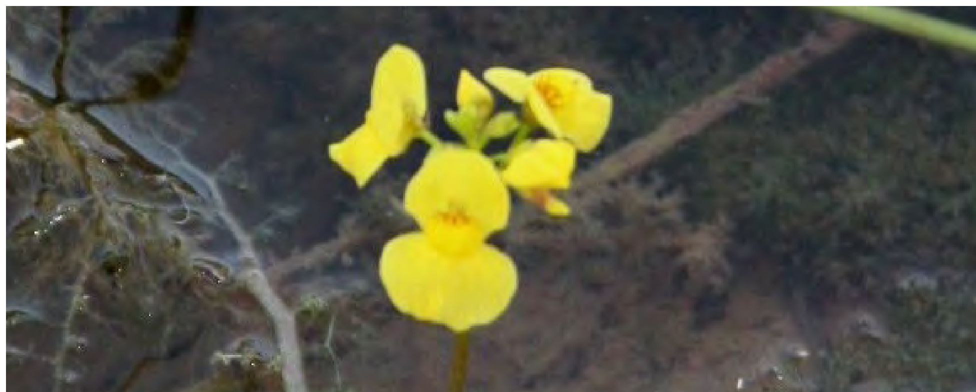
Uses:

Increase resistant to disease, Beneficial for cold, cough and fevers, helpful against insect and snakebite, helpful against chronic, skin disease.



Utricularia aurea Lour.

Utricularia flexuosa Vahl



Vernacular name:

Bhaturidalak (O), Jhangi (Beng.)

Family:

LENTIBULARIACEAE

Botanical description:

Aquatic floating herb. Traps shortly stalked, globose, mouth basal. Inflorescence erect, peduncle filiform, glabrous; flowers 3-4, distant, yellow; upper lobe of corolla broadly ovate, apex rounded. Capsule globose, circumscissile.

Distribution:

East & South-East Asia and Australia

Ecology and habitat:

Subaquatic or terrestrial in seasonally flooded shallow pools with sandy soils or in rice fields.

Flowering and fruiting:

November-December.

Uses:



Utricularia bifida L.



Vernacular name:

Chota jhangi (Beng.)

Family:

LENTIBULARIACEAE

Botanical description:

Terrestrial herb. Foliar organs scattered on stolons, narrowly linear,1-1.5 x 0.1 cm, 1-nerved,apex rounded. Traps on vegetative organs, stalked, globose, 0.6-1 mm long, mouth basal, upper lip with 2 simple subulate appendages, lower lip with a more or less well developed obtuse swelling at the distal end of the stalk. Peduncle filiform, terete, glabrous above, minutely glandular below; flowers few,distant;scales few,similar to bracts;bracts basifixed,broadly oblong or ovate-oblong, ca. 1 mm long, obtuse; broadly ovate,ca 3 mm long at anthesis, up to 6 mm in fruit, base more or less broadly connate and decurrent, apex obtuse. Corolla oblong, apex rounded, slightly longer than the upper calyx lobe, lower lip orbicular,apex rounded, spur subulate, acute,curved,longer than and diverging from the lower lip. Capsule broadly elliptic, 2.5-3 mm long. Seeds numerous, ovoid, testa rugose, reticulate, reticulations elongate.

Ecology and habitat:

Subaquatic or terrestrial in seasonally flooded shallow pools with sandy soils or in rice fields.

Distribution:

Throughout India, extending to China and Japan, Indo-China, Malaysia to Northern parts of Australia

Flowering and fruiting:

July-September

Uses:

Lindernia crustacea (L.) F.v. Muell

Vandellia crustacea L.



Vernacular name:

Family:

SCROPHULARIACEAE

Botanical description:

Glabrous herb, stems and branches angled. Leaves ovate, entire, serrate or crenate, obtuse or acute, base broad or narrowed. Flowers bluish or blue-violet, axillary and terminal, pedicels erect or spreading, slender. Capsule ovoid.

Distribution:

Africa, America and Tropical and subtropical Asia.

Ecology and habitat:

Common in waste localities, agricultural fields and sandy soils.

Flowering and fruiting:

July-December

Uses:

Beneficial for bilious disorders, dysentery, amenorrhea and hepatitis.



Corchorus aestuans L.

C.acutangulus auct. non Forssk.



Vernacular name:

Bananalita, Buda nalita (O); Ban maricho (Bondo).

Family:

TILIACEAE

Botanical description:

Erect or diffuse herb. Leaves ovate to oblong-ovate, serrate, the lowest serratures on each side often produced into very slender tails, acute, pubescent, 3-nerved. FIowers yellow, axillary, solitary or paired. Sepals lanceolate, long, broad at apex, mucronate, glabrous, rarely sparsely hairy. Petals about as long as the sepals, spathulate. Capsule long, 6-angled, subulate, apex with spreading horned beaks.

Distribution:

Native to America lout spread as invasive weeds throughout the tropics.

Ecology and habitat:

It is common in moist areas and coastal grasslands.

Flowering and fruiting:

Fl: July-September
Fr: October-December

Uses:

The leaves are used against the treatment of head-ache.



Sida cordifolia L.



Vernacular name:

Bajramuli (O), Brela (Beng.) Kungyi (H).

Family:

MALVACEAE

Botanical description:

Erect herb or undershrub, stem, petioles and pedicels tomentose by minute stellate hairs, intermingled with many or few patent simple hairs. Leaves ovate to ovate-oblong, rarely orbicular, usually cordate, occasionally truncate or rounded, crenate, tomentose. Flowers axillary, solitary or in clusters, especially towards the top of the stem. Corolla whitish or yellow, petals obliquely obovate, apex truncate, base ciliate. Staminal column long, simple hairy or glabrous. Mericarps, flattened-trigonous.

Distribution:

Native to India but distributed and considered as an invasive weed. In Africa, Australia and southern United states etc.

Ecology and habitat:

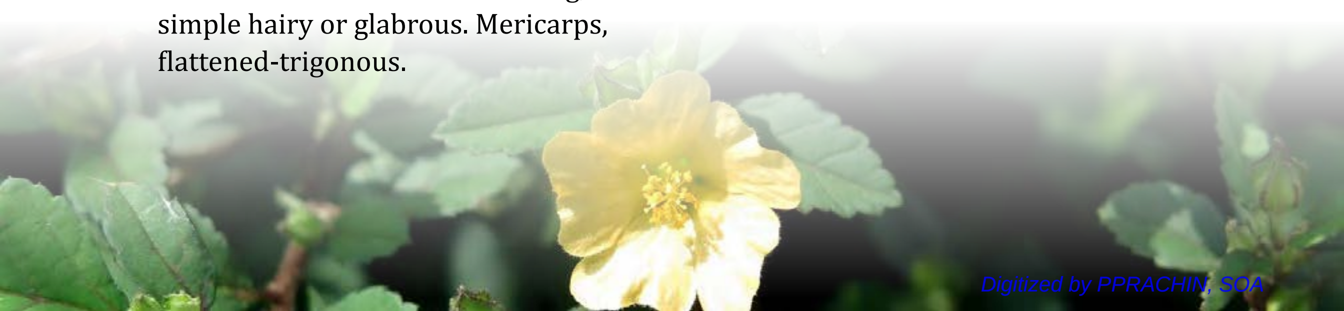
Common in Wasteland and roadsides

Flowering and fruiting:

Fl: August-December,
Fr: October-January

Uses:

Beneficial for curing Asthma. Leaves are cooked and eaten in cases of bleeding piles.



Urena lobata L. subsp. sinuata (L.) Borssum

Urena lobata L.



Vernacular name:

Kunguya, Lobloli, Lot lotti, Kunjuya (H); Kunjiya, Kunguya (Beng.).

Family:

MALVACEAE

Botanical description:

Annnual erect undershrub. Leaves ovate or orbicular, angular, shallowly or deeply palmilobed or fid; serrate to crenate, 3-9 nerved at base. Epicalyx copular in fruit. Flowers with purple centre, rotate. Schizicarp globose, glochidiate, seeds reniform.

Distribution:

Widely distributed throughout South East Asia and America.

Ecology and habitat:

Road side, waste places and near crop fields; common after rainy season.

Flowering and fruiting:

August -December

Uses:

The juice of the leaves or roots is used widely to treat colic, stomach-ache, diarrhea, rheumatism, skin disease and dysentery.



Martynia annua L.

Martynia diandra Gloxin.



Vernacular name:

Angora (O); Baghanakhi (O,H,Beng.); Devils claw, Tiger claw (E).

Family:

MARTYNIACEAE

Botanical description:

Undershrub. Leaves broadly ovate or deltoid, long and broad, repand-dentate, acute, base cordate. Racemes, erect, 7-12-flowered, flowers drooping; bracts broadly ovate; corolla purple with yellow throat, glandular hairy, mouth very oblique; lobes unequal, suborbicular. Fruit ridged, with 2 hooked, stout claws.

Distribution:

Tropical and subtropical America naturalized in Indian subcontinent.

Ecology and habitat:

Common in waste places and coastal sand dunes.

Flowering and fruiting:

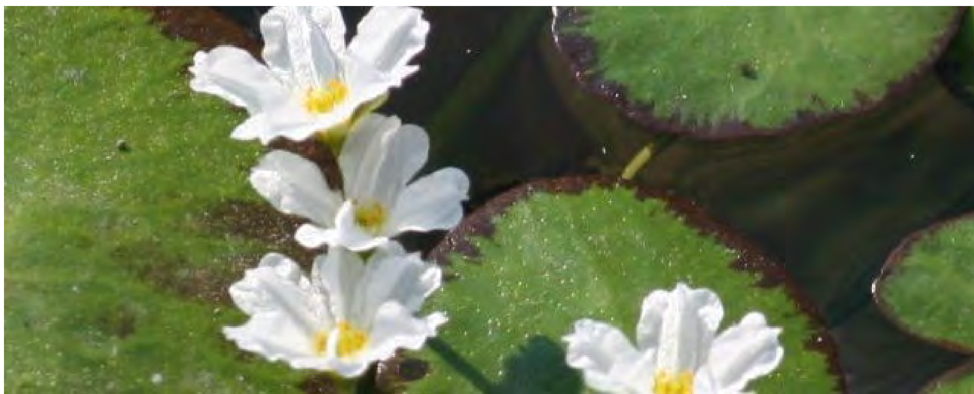
Fl: August- October.
Fr: November-January.

Uses:

Beneficial for treatments of epilepsy, inflammation, sore throat, burns, itching, skin infections and tuberculosis etc.

Nymphoides hydrophylla (Lour.) Kuntze

Limnanthemum crisatum (Roxb.) Griseb.



Vernacular name:

Paniseuli (O); Chand-malla (Beng.) Tagarmul (H).

Family:

MENYANTHACEAE

Botanical description:

Perennial aquqtic herb. Petioloid stems long, filiform. Leaves floating, elliptic to orbicular, faintly crenate, pale green above, purplish and prominently nerved beneath, base deeply cordate. Flowers white, yellow at the centre, on slender pedicels rising one by one above the water to open. Fruit capsular, 2-4 valved; seeds tuberculate.

Distribution:

Native to tropical Asia

Ecology and habitat:

Quite gregarious on water surface of ponds, lakes rice fields and other stagnant water bodies.

Flowering and fruiting:

Most part of the year.

Uses:

Useful in jaundice, tuberculosis, anemia, epilepsy etc.



Nymphoides indica (L.) Kuntze.

Limnanthemum indicum (L.) Griseb.



Vernacular name:

Sadom Lachomkorba (M), Panchuli (Beng.) and Barachuli (H).

Family:

MENYANTHACEAE

Botanical description:

Perennial, rhizomatous aquatic herb. Leaves floating, rather fleshy, light green above, orbicular, margin sinuate, smooth above, verrucose and plamately nerved, base deeply cordate. Flowers white, in dense, sessile umbels at the nodes on long pedicels; corolla white, yellow in the center; lobes fimbriate on the margins. Fruit a capsule; seeds smooth.

Distribution:

Tropical Areas around world.

Ecology and habitat:

Fairly abundant as a floating aquatic in water bodies; often fully covering the water surface.

Flowering and fruiting:

Most part of the year.

Uses:

Tubers and flowers are used to treat wound, menorrhagia, dysentery and candida infections.



Mimosa pudica L.



Vernacular name:

Lajakuli, (O); Lajak, Kajak (Beng.), Lajawanti(H); Touch me not (E).

Family:

MIMOSACEAE

Botanical description:

Small prostrate prickly herb. Leaves spreading, long petioled; leaflets sessile, linear, subacute, ciliate beneath and on the margins, base truncate; stipules pectinately ciliate. Heads pink; flowers bisexual. Pods clustered, flat, slightly undulate, jointed, with weak prickles on the sutures. Seeds compressed, ovoid.

Distribution:

Native to south and central America but wide spread in the tropical regions of the world.

Ecology and habitat:

Fairly abundant in waste places, rice fields and forest floors.

Flowering and fruiting:

August - May.

Uses:

Beneficial for urogenital disorders, piles, dysentery, sinus and applied on wounds.



Najas indica (Willd.) Cham.

Najas falciculata Braun



Vernacular name:

Family:

NAJADACEAE

Botanical description:

Slender aquatic herb with filiform stems. Leaves filiform or very narrowly linear, often setaceous, broad, flat or subterete or triangular, margin on conspicuous, fine spiny teeth, apex acute to obtuse; sheath on either side with spines, minutely toothed or auricles almost absent. Flowers mostly solitary.Seeds ellipsoid; testa with minute.

Distribution:

Found in India, China, Japan, South-East Asia and New Guinea.

Ecology and habitat:

Cosmopolitan in fresh water habitats, especially still or slowly moving waters.

Flowering and fruiting:

April-May

Uses:

It is a good food and shelter for fishes as well as crabs.



Najas marina L.

N. major All.



Vernacular name:

Family:

NAJADACEAE

Botanical description:

Stouter plant with the internodes sometimes dentate. Leaves broad, with 4-8 spiny almost triangular teeth on each side; sheath with rounded entire sides. Flowers dioecious, solitary; neck of the spathe of male flowers up to twice as long as broad, margin with a few minute spines; spathe of female flowers absent.

Distribution:

Found across Europe Asia, Africa, Australia, America etc.

Ecology and habitat:

Gregarious, Fresh or brackish water lagons or lakes found up to 2.700 meters.

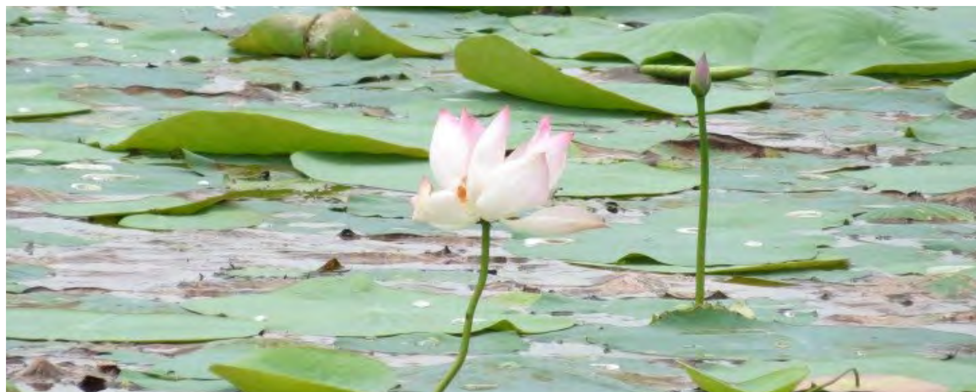
Flowering and fruiting:

September-November.

Uses:

This plant provides food and shelter for aquatic organisms.

Nelumbo nucifera Gaertn.



Vernacular name:

Padma (O), Rakta Padma (Beng.), Kamal (H), Lotus (E).

Family:

NELUMBONACEAE

Botanical description:

Submerged-rooted aquatic plant. Leaves round, waxy, glaucous beneath; petiole to 2 m. Flowers pinkish-white or about 20 cm across. Sepals greenish-white, ovate. Petals elliptic, apex obtuse. Receptacle 5-8 cm. Ripened carpels nut-like.

Distribution:

Western Asia from India eastward China, Japan and Australia.

Ecology and habitat:

Common in lakes, ponds, swamps and ditchs.

Flowering and fruiting:

Fl: April-July,
Fr: December- January

Uses:

Roots young leaves stems, seeds etc. are edible. It is used as astringent, cardiotonic, febrifuge, hypotensive etc. Also useful in diarrhea, sunstroke, gastric ulcer, hemolysis, epistasis, uterine bleeding and fever etc.



Boerhavia diffusa L.



Vernacular name:

Kharkharia, parni, Kechna, Guodapuruni (O)

Family:

NYCTAGINACEAE

Botanical description:

Diffuse herb;stem glabrous or minutely pubescent, often purplish,thickened at the nodes. Leaves in unequal pairs, broadly ovate or suborbicular, 1.5-5 x 1.5-4.3 cm, obtuse or rounded at apex, green and glabrous above, usually whitish beneath, base rounded or subcordate; petiole nearly as long as the blade. Flowers very small, pink, sessile or subsessile, in heads or small umbels on slender peduncles from the leaf-axils and in axillary and terminal panicles. Perianth 2-4 mm long, campanulate, tube constricted above the ovary and glandular, lobes emarginated. Stamens 2-3. Anthocarps clavate, 3 mm long, 5-ribbed, glandular.

Ecology and habitat:

Fairly common weed. Found along roadsides, near habitations, in and along cultivated fields and in open cleared patches in forests

Distribution:

Throughout India. Pantropical; Australia

Flowering and fruiting:

Throughout the year

Uses:

It is used for pain relief, anti-inflammation and treating indigestion.

Euryale ferox Salib.



Vernacular name:

Kantapadma (O), Makhana (H)

Family:

NYMPHAEACEAE

Botanical description:

Scarcely rhizomatous, very deeply rooted by means of thick, fleshy fibrous roots. Stem very small. Leaf buds curiously folded up in an involucres which bursts when leaf expands. Leaves large, round or oval, peltate, entire, deep purple beneath, prickly on the nerves; petioles prickly. Peduncles prickly, ending in a single flower. Flowers violate, blue or red . Sepals caduceus smooth and coloured inside. Stamens also reducing in size towards the center;anthers oval. Berries oval or globular, prickly, sometimes irregular in shape due to swelling in many places by the growth of the seeds, gradually irregularly breaking up.

Ecology and habitat:

Found in freshwater tanks and lakes

Distribution:

Most part of India, South-East Asia, China

Flowering and fruiting:

Fl: May - June
Fr: July - August

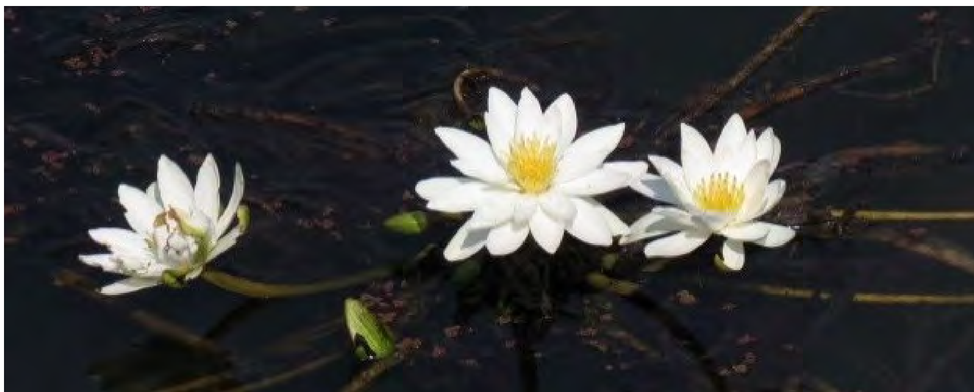
Uses:

The fruits are edible and the seeds are roasted and eaten. On roasting the seed coat bursts and is peeled off. This yields valuable dry fruit sold in the market under the Hindi name 'Makhana'.



Nymphaea nouchali Burm.f.

Nymphaea stellata Willd.



Vernacular name:

Padma, Subdikain(O), Sundi (Beng.), Nil Padma(H).

Family:

NYMPHAEACEAE

Botanical description:

Submerged rooted aquqtic plant. Leaves sinulate or dentate on margins, greenish above,purple eneath.Flowers blue,white or rose. Sepals oblong, ovate-oblong, obscurely nerved.Petals oblong or oblanceolate. Filaments yellow. Cells of the ovary separated by a double wall.

Distribution:

It is native to Southern & Eastern parts of Asia.

Ecology and habitat:

Common in lakes, ponds, swamps and ditchs.

Flowering and fruiting:

Throughout the year.

Uses:

The flower of this plant has antihepatotoxic properties. Rhizome and peduncles are eaten as vegetable. Fried seeds are edible.



Nymphaea pubescens Willd

Nymphaea esculenta Roxb.



Vernacular name:

Nalikain (O), Rakta kambal, Lambal (Beng.) and Nilkamal(H).

Family:

NYMPHAEACEAE

Botanical description:

Submerged-rooted aquatic plant. Leaves green above, purple and pubescent beneath, margins sharply dentate. Flowers pink or red. Sepals ovate-oblong, prominently nerved. Filaments of stamens yellow. Cells of ovary separated by single wall.

Distribution:

Native to India and South-East Asia

Ecology and habitat:

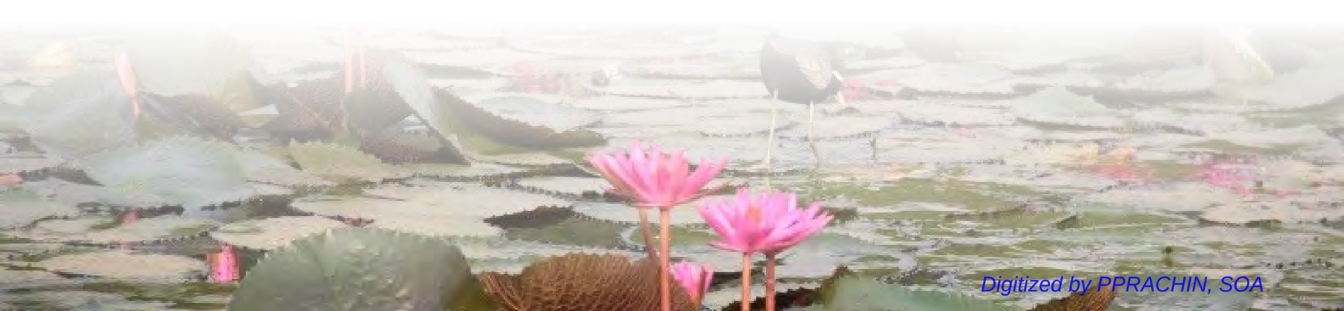
Common in lakes, ponds, swamps and ditches.

Flowering and fruiting:

Throughout the year.

Uses:

Decoction of rhizome of red flowered plant is given for blood dysentery. Powdered rhizome with honey is given for piles and dyspepsia.



Ludwigia adscendens (L.) Hara.

Jussiaea repens L.



Vernacular name:

Jagal (O)

Family:

ONAGRACEAE

Botanical description:

Prostrate or ascending, glabrous herbs, rooting at the nodes, with white, spindle shaped aerophores at the nodes of floating stems. Leaves oblanceolate or obovate, acute or obtuse; petiole long. Flowers white, yellowish at the base. Capsule cylindric, glabrous of hairy, thick walled.

Distribution:

Asia, Australia, Africa and South America.

Ecology and habitat:

Fairly abundant and floating on water surface in lakes, ponds and ditches and rice fields.

Flowering and fruiting:

December-July

Uses:

Whole plant is used in ulcers and other skin diseases. Extracts of leaves and stem exert stong antimicrobial activity similar to that of standard antibiotics. The Plant is also used as emetic, Laxative, anthelmintic and anti-dysenteric etc.



Ludwigia perennis Linn.

L. parviflora Roxb.



Vernacular name:

Bila labanga, Latkera (O).

Family:

ONAGRACEAE

Botanical description:

Annual herb, usually erect, glabrous. Leaves lanceolate or linear-lanceolate subacute, tapering at the base into a. short petiole. Flowers yellow, 4-merous, very shortly pedicelled, solitary axillary. Capsule oblong, inflated; seeds pluriseriate in each cell.

Distribution:

Found throughout tropical world also found in Himalayas up to 1400m attitude.

Ecology and habitat:

Quite common in wet places, moist and shady localities and near water bodies.

Flowering and fruiting:

Fl: October-November,
Fr: November-January.

Uses:

Useful in fever.

Oxalis corniculata L.



Vernacular name:

Ambiliti, Kumari (O); Amrul (Bengal); Amrul sak, Chukutri pati (H); Indian Sorrel (E).

Family:

OXALIDACEAE

Botanical description:

Procumbent herb. Stem creeping, rooting at nodes, hairy. Leaves alternate; leaflets subsessile, obcordate, apex emarginate or deeply cordate, base cuneate; ciliate on the margins and lower side. Flowers yellow, in 2-8-flowered pseudo-umbels, pilose. Capsules narrowly oblong, abruptly tapering above, puberulous. Seeds ovoid or ellipsoid.

Distribution:

Cosmopolitan.

Ecology and habitat:

Locally abundant in shallow water, muddy soil and rice fields.

Flowering and fruiting:

All the year round.

Uses:

Edible, Useful in the treatments of influenza fever, urinary tract, infections, diarrhea, traumatic injuries etc. Leaf juice is locally applied to cure warts in skin.

Eleusine indica (L.) Gaertn.



Vernacular name:

Ana mandia (O); Malan kuri, Mandla (H); Crow foot grass, Crab grass (E).

Family:

POACEAE

Botanical description:

Tufted annual herb. Culms erect or slightly geniculate. Leaves linear, acute, flat or complicate, glabrous and smooth, rarely sparingly hairy; sheaths loose; ligule very small, membranous.. Spikes 3-7, erect or spreading at the top of the culm, slender. Spikelets mostly poiting forwards, 3-5-flowered. Grain oblong and obtusely trigonous with oblique base, transversely rugose, sometimes obscurely so, tip obtuse or rounded.

Distribution:

Tropical and Temperate zones of the world.

Ecology and habitat:

Frequently found in moist grass lands and waste grounds.

Flowering and fruiting:

August - February

Uses:

The seeds are edible. The plant is applied externally on wounds to stop bleeding, useful against Malaria Fever etc.

Eragrostis ciliaris (L.) R.Br.



Vernacular name:

Family:

POACEAE

Botanical description:

Annual herb; culms slender. Leaves usually ascending, flat to convolute. Panicle spiciform, often more or less lobed or interrupted. Spikelets densely crowded, ovate, often purplish, 6-12-flowered; rachilla more or less jointed, breaking up from apex downwards. Lemma long-cilate on the keels; cilia on keels of palea soft. Caryopsis linear-oblong, enclosed by lemma and palea.

Distribution:

Tropical and sub-tropical regions of Africa and Asia.

Ecology and habitat:

Common in waste palces and grassy fields.

Flowering and fruiting:

August- December

Uses:

Eaten as cereal. Useful in the treatments of stomach pain.



Eragrostis gangetica (Roxb.) Steud.



Vernacular name:

Kankra chare (O).

Family:

POACEAE

Botanical description:

Annuals grass. Culms tufted, slender, erect; nodes glabrous. Leaves linear or linear-lanceolate, finely acuminate; ligule truncate, fimbriate, membranous. Panicle ovate, ovate-oblong or elliptic, long, lax, grey. Spikelets ovate-oblong or oblong-lanceolate, slate-grey. Glume ovate-lanceolate, chartaceous, 1-nerved; upper slightly larger. Caryopsis oblong.

Distribution:

Subtropical and Tropical Africa and East Asia.

Ecology and habitat:

Common in cultivated land, lawns, along ditches and marshy land.

Flowering and fruiting:

September-February.

Uses:

Eaten as cereal. Beneficial for the treatment of sorefeet.

Eragrostis japonica (Thunb.) Trin.

Eragrostis interrupta Lam.



Vernacular name:

Family:

POACEAE

Botanical description:

Tufted annual herb. culms erect, leaves flat, ligule membranous, truncate, fimbriate. Panicle oblong or linear, long; branches ascending close to the main axis or spreading and the panicle lanceolate to narrowly ovate. Spikelets shortly pedicelled and appressed to the secondary branchlets or longer pedicelled and spreading. Spikeiets 4-14- flowered, ovate-oblong, breaking up from the apex. Caryopsis ellipsoid.

Distribution:

Tropical regions of Asia, Europe & Africa.

Ecology and habitat:

Common along streams, river banks and other wet places.

Flowering and fruiting:

October-January

Uses:

Edible, also used as fodder and forage.

Eragrostis pilosa (L.) P.Beauv.



Vernacular name:

Family:

POACEAE

Botanical description:

Annual herb. Culms slender, mostly simple. Leaves linear, acuminate, base and mouth of sheath with cilia; ligule a ring of short hairs. Panicle open, rarely contracted. Spikelets long pedicelled, mostly grey or purple, narrow, straight. Caryopsis brown, oblong with one side straighter than the other.

Distribution:

Throught out India tropical regions of Asia, Europe and Africa

Ecology and habitat:

Frequent along roads, field bunds and edges of water bodies.

Flowering and fruiting:

July- December

Uses:

Edible by human, Used as fodder and forage.



Hygroryza aristata (Retz.) Nees ex Wight & Arn.



Vernacular name:

Family:

POACEAE

Botanical description:

Perennial floating aquatic herb; culms spongy, with whorled capillary green roots at nodes. Leaves ovate, ovate-oblong, subcoriaceous, obtuse, base rounded or subcordate, shortly petioled; sheaths much inflated, mouth auricled; ligule O. Panicle effuse, with few spreading branches, lower whorled, often deflexed; spikelets few; lemma narrowly lanceolate, 7-nerved, awned. Caryopsis narrowly oblong.

Distribution:

It is native to china, Bangladesh, Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam.

Ecology and habitat:

Common in tanks, lakes and slow-moving streams; often making pure communities.

Flowering and fruiting:

October

Uses:

Useful in Acid reflex, Dipsia, Diarrhea, fatigue, Urinary Problems.



Leersia hexandra Sw.



Vernacular name:

Family:

POACEAE

Botanical description:

Slender perennial herbs; culms rooting from lower nodes. Leaves usually stiff, striate, scabrid, acuminate, narrowed at the base; sheaths striate, very scabrid; ligule truncate. Panicle slender, contracted, with distant branches, flexuous. Spikelets 1-flowered, laterally compressed, closely imbricate, oblong, green. Caryopsis oblong, compressed.

Distribution:

Throught out India tropical and subtropical regions of the America, Africa, South East Asia and Australia.

Ecology and habitat:

Gregarious and often forming matted growth on water surfaces in tanks and lakes, also in marshes and rice fields.

Flowering and fruiting:

July-February

Uses:

Often used as a fodder for domestic animals.



Oryza rufipogon Griff.



Vernacular name:

Balunga (O).

Family:

POACEAE

Botanical description:

Perennial, tufted grass; culms white or purplish, erect or ascending, rooting in the basal part; lower sheaths slightly inflated, the upper ones tight. Leaves linear, margins scabrous; ligule triangular. Panicles loosely contracted; peduncle and axis terete, ribbed; branches ascendingly patent to erect, 1-9-spiked; pedicels clavate; spikelets caducous, oblong, awned. Caryopsis lanceolate to obovate-lanceolate, cylindrical, red-brown.

Distribution:

It is native to East, South and South-East-Asia.

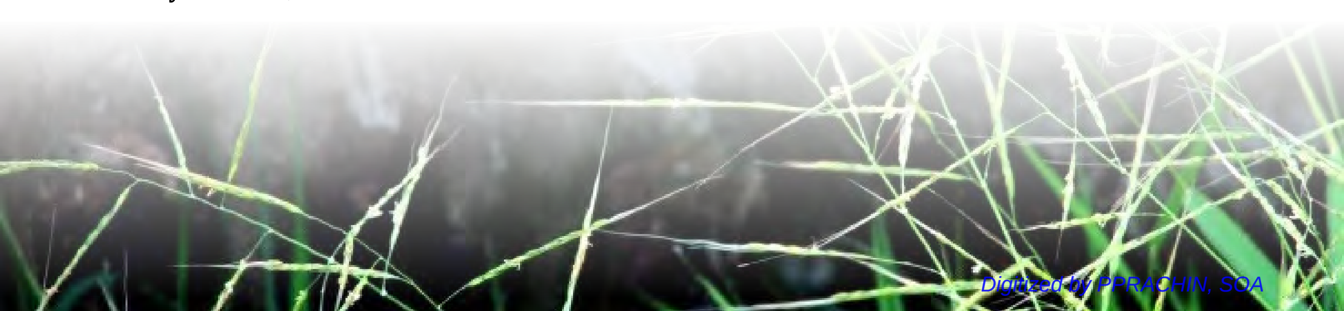
Ecology and habitat:

Frequent near rice fields, in swamps, ditches, tanks and other water courses.

Flowering and fruiting:

September - November

Uses:



Panicum sumatrense Roth Ex Roem. Schult



Vernacular name:

Gundla, Gundli, Kosala (O)

Family:

POACEAE

Botanical description:

Annual; culms 30-90 cm, rerect or geniculate at base; nodes glabrous. Leaves linear, 15-60 cm. long, gradually tapering from a broad base, usually under 1.2 cm but up to 2.5cm broad in some cultivated forms, glabrous or finely hairy; sheaths glabrous; ligule a narrow row of hairs. Panicle very compound, contracted, 10-25 cm long, often nodding. Spikelets persistent, 2-3 mm long, suddenly acute or slightly cuspidate, mostly paired on unequal pedicels but often solitary, lanceolate in flower, elliptic or broadly elliptic in fruit. Lower glume very broad or orbicular, amplexicaul, subtruncate then suddenly acute, apiculate or scarcely acute, about one third the spikelet, very thin; upper glume elliptic, obtuse (sometimes appearing cuspidate or murcronate) 9-nerved. Lower lemma similar to the upper glume, paleate; upper lemma narrow-elliptic or elliptic oblong,2-2.5 mm long, truncate at base minutely apiculate at tip, white or pale brown or dark brown and more broadly elliptic when ripe. Caryopsis 2-2.5 mm long

Ecology and habitat:

Frequently cultivated and often found as an escape.

Distribution:

Cultivated or naturalized throughout India. SE.Asia, Malaysia.

Flowering and fruiting:

May-June

Uses:

Paspalum distichum L.



Vernacular name:

Family:

POACEAE

Botanical description:

Perennial, stoloniferous herbs; stolons leafy, rooting at the nodes, glabrous; culms erect to ascending. Leaves lanceolate or linear, flat; sheaths lightly keeled, pilose; ligule membranous, collar-shaped. Racemes 2, subopposite, erect to reflexed, rachis flattened or triquetrous. Spikelets solitary, imbricate, ovate-elliptic, pale green. Caryopsis elliptic or ovate, plano-convex.

Distribution:

Tropical and subtropical regions of the world. America, Europe, South-East Asia, Australia.

Ecology and habitat:

Quite abundant in rice-fields, wet and marshy places.

Flowering and fruiting:

April-December

Uses:

It is used as Fodder and forage.



Paspalum scrobiculatum Linn.

Paspalum orbiculare Forst. f.



Vernacular name:

Kodua, Kodus, Koda (O); Kodoa dhan, Kodaka (H); Kodo Millet (E).

Family:

POACEAE

Botanical description:

Annual or perennial herbs; rhizome short; culms glabrous, tusted, erect, ascending or creeping and rooting at the lower nodes. Leaves linear-lanceolate or linear, margins scabrous, base rounded or shallowly cordate, mid-nerve prominent; sheaths inflated; ligule membranous, fimbriate. Racemes 2-6; rachis flat; spikelets broadly rotundate elliptic to almost orbicular, subimbricate in 2 rows. Caryopsis biconvex, Pale.

Ecology and habitat:

Quite abundant in rice fields, moist and wet places; also cultivated on a small scale as a cereal crop.

Distribution:

India, Philippines, Indonesia, Vietnam, Thailand and in West Africa

Flowering and fruiting:

Most part of the year

Uses:

Used for the treatment of diabetes, used for preparation of mat, livestock food.



Polygonum barbatum Linn.



Vernacular name:

Bekh-Unjubaz (Beng.), Garoara, Naira(M)

Family:

POLYGONACEAE

Botanical description:

Erect or spreading herb, 60-90 cm; branches glabrous or nearly so. Leaves sessile or subsessile, linear-oblong or linear-lanceolate,4-17-5 x 0.7-2 cm, acuminate or acute, strigose on both sides or only on nerves beneath with few scattered hairs in between, base acute; stipules with excurrent bristles longer than the tube. Racemes spiciform, terminal, slender, 3-10 cm long, panicled; peduncles glabrous or nearly so; bracts short, glabrous, setose on margins. Flowers white-pinkish. Styles mostly 3. Nut trigonous

Ecology and habitat:

Common along rivers and streams.

Distribution:

Throughout the hotter parts of India. Tropical Africa, West Asia, Himalaya, China, Southern Japan, Malaysia, Australia.

Flowering and fruiting:

Flowering: August-September. Fruiting: September-October

Uses:



Polygonum plebeium R.Br.



Vernacular name:

Muthi saga, Chanti saga (O); Chemti Sag, Dubia sag (Beng.)

Family:

POLYGONACEAE

Botanical description:

Prostrate herb; stems several from the root, grooved, scabrous. Leaves linear, linear-oblong or obovate-oblong, often with revolute margin; stipules fimbriate, with excurrent nerves. Flowers small, white, green to pink, with green midrib, crowded in the leaf axils. Nuts spindle-shaped, triquetrous, brown, shining.

Ecology and habitat:

Fairly common in moist places, harvested crop fields and waste lands

Distribution:

South Asia, America and Australia

Flowering and fruiting:

February - June

Uses:

Edible



Schoenoplectus articulatus Linn.

Scripus articulatus Linn.



Vernacular name:

Gaichira, Charchadi (O)

Family:

CYPERACEAE

Botanical description:

Annual or perennial caespitose herb; stem erect, 2-40 cm, terete, fistulose, more or less distinctly transversely septate, smooth. Leaves reduced to 1-2 bladeless, scarious, obliquely truncate sheaths. Inflorescence pseudolateral, capitates, globose, consisting of numerous spikelets; involucral bract erect, similar to and continuous with the stem, terete, transversely separate, somewhat to much longer than the stem proper, up to 60 cm long (hence inflorescence seemingly inserted in the lower half of the stem). Spikelets brown sessile, ovoid to oblong-ovoid, 5-10 x 3-4 mm, terete, acutish, densely mny-flowered. Glumes firm, appressed, concave, with scarcely prominent keel, broadly ovate, 3-5 mm long and wide, acute, apiculate, many-nerved, brown or rufous-testaceous. Bristles none. Stamens 3. Stigmas 3. Nut triquetrous, obovoid, 1.75 mm long, conspicuously to obsoletely transversely wavy-ridged, black.

Ecology and habitat:

Common in marshy places

Distribution:

Throughout India, Tropical Asia.

Flowering and fruiting:

December - April

Uses:

used in diarrhea and vomiting

Eichhornia crassipes (Mart.) Solms-Laub.

Pontederia crassipes Mart.



Vernacular name:

Bilati Dala, Kajaropati, Raja dala, Naga dala (O)

Family:

PONTEDERIACEAE

Botanical description:

Floating aquatic herb with a very short leafy main-stem, sending down a large bunch of long fibrous roots; sometimes rooting in the mud. Leaves radical, rosulate, emerged, petiole spongy, blade broadly ovate or rhomboid, very obtuse, finely and densely curvinerved. Flowers lilac or pale violate, funnel-shaped, flowering, trimorphic. Fruit a capsule, ovoid-oblong.

Distribution:

Native to Amazon Basin out treated as invasive weed in other parts of the world. Treated as a most notorious invasive aquatic weed

Ecology and habitat:

Gregarious and troublesome weed in stagnant and slow-moving water bodies and rice fields.

Flowering and fruiting:

Most part of the year

Uses:

The plants are also used as animal feed and organic fertilizer.



Monochoria hastata (L.) Solms-Laub.

Monochoria hastataefolia Persl.



Vernacular name:

Kajalpatia (O).

Family:

PONTEDERIACEAE

Botanical description:

Aquatic herb with erect or suberect stems. Leaves triangular-ovate with a sagittate or hastate or very rarely cordate base, acute or obtuse, many-nerved, basal lobes divergent, mostly with acuminate, narrowed or rarely rounded apex. Inflorescence shortly racemed or subumbellate. Flowers pale blue. Capsule enclosed in the persistent twisted perianth, subglobose or oblong.

Distribution:

The species occurs in India, Sri Lanka and South-East- Asia extended up to Australia.

Ecology and habitat:

Common in shallow and stagnant water bodies, margins of lakes, ponds, canals and in paddy fields.

Flowering and fruiting:

April-September

Uses:

Leaves are used in Stomach-ache, Alzheimer and Tooth-ache.



Monochoria vaginalis (Burm.f.) Presl.

Pontederia vaginalis Bunn.



Vernacular name:

Mirmira (O); Nukha, Nanka (Beng.).

Family:

PONTEDERIACEAE

Botanical description:

Aquatic herb with erect or suberect stems; rootstock usually very short. Leaves very variable, broadly ovate, ovate-oblong, linear or lanceolate, acuminate or very acute, base obtuse, rounded, truncate or cordate. Flowers lilac blue, reflexed after flowering. Capsule oblong, membranous, loculicidally dehiscing into 3 valves.

Distribution:

Native to Asia but known as invasive species in other parts of the world.

Ecology and habitat:

Frequent in muddy places, swamps, rice fields and along margins of pools and lakes.

Flowering and fruiting:

August-November.

Uses:

Used for Asthma & cough. Whole plant is used in the treatment of tooth-ache. Also used as ornamentals plants.



Portulaca oleracea L.



Vernacular name:

Badabalbalua (O); Dali ara (K); Mota uricalang(S);Baraloniya (Beng.); Khursa, Baralaniya,Kulfa (H); Peddapayili-kura, Ganga-pavilikura (T).

Family:

PORTULACACEAE

Botanical description:

Prostrate herb, branchlets glabrous, green or
purplish. Leaves alternate or subopposite, obovate-spathulate, apex obtuse or truncate, fleshy. Flowers yellow, sessile solitary or 2-3 in a capitulum. Sepals lanceolate, subequal, carinate. Petals obovate. Seeds brown, minutely tubercled.

Distribution:

Extending from North Africa and Southern Europe. Through the Middle Ease and the Indian sub-Continent to Malaysia and Australia.

Ecology and habitat:

Very common in swampy and moist soil.

Flowering and fruiting:

Throughout the year.

Uses:

Its leaves are used as green vegetable; also for insect or snake bites, boils, pain from bee stings.



Potamogeton nodosus Poir.

Potamogeton indicus Roxb.



Vernacular name:

Family:

POTAMOGETONACEAE

Botanical description:

Submerged, rooted aquatic herb; stem slender, terete, branched. Leaves all petioled, upper or all leaves floating, broad; floating leaves elliptic-lanceolate or oblong, shining, coriaceous, with strong mid-rib and 13-15 parallel nerves. Spikes dense-flowered, on axillary or leaf-opposed peduncle, spikes raised just above water surface. Flowers white hard endocarp, truncate, shortly beaked.

Distribution:

It is native to Europe, Asia and Americas.

Ecology and habitat:

Occasional, a submerged aquatic plant in fresh-water lakes and ponds, also in slow running waters.

Flowering and fruiting:

Most part of the year.

Uses:

Used as food resources for migratory ducks. Also beneficial for cough & cold, Tuberculosis, cancer, wound etc.



Dentella repens (L.) J.R & G.Forst.



Vernacular name:

Family:

RUBIACEAE

Botanical description:

Small prostrate herb; distichously branched, rooting at the nodes. Stem 4 gonous, furrowed, glbrous. Leaves opposite, sessile or oblong-elliptic, glabrous or sparsely hairy. Flowers sessile or very shortly pedicelled, whiteacute or obtuse. Fruits globose or obovoid, densely covered with hyaline trichomes, crowned by persistent calyx.

Distribution:

It occurs in Indo-Malaysian Region.

Ecology and habitat:

Gregarious in moist soil surfaces throughout the area.

Flowering and fruiting:

Fl: April-October,
Fr: Most part of the year.

Uses:

Leaves are used in case of blood ailments to purify the blood.



Hedyotis diffusa Willd.

Oldenlandia diffusa (Willd.) Roxb.



Vernacular name:

Bongam joi (O).

Family:

RUBIACEAE

Botanical description:

Diffuse, glabrous herb. Leaves sessile, linear or lanceolate, glabrous. Flowers white, axillary, solitary or in pairs, sesile or with peduncles, scarcely exceeding the length of the flower. Capsule truncate, smooth, protruded beyond the calyx, loculicidal. Seeds angular, reticulate.

Distribution:

Found in Asia

Ecology and habitat:

Common in wet places near rivers, ponds, rice fields etc.

Flowering and fruiting:

May- November

Uses:

Useful in hepatitis, appendicitis and urethritis etc

Limnophila heterophylla (Roxb.) Benth.

L. roxburghii G.Don.



Vernacular name:

Ambakasia (O).

Family:

SCROPHULARIACEAE

Botanical description:

Erect aroatic herb, decumbent below; stems glabrous. Lower leaves capillary multifid; intermediate leaves 4-6 in a whorl, pinnatifid; upper leaves usually opposite, sessile, semi-amplexicaul, oblong, serrulate, acute. Flowers purplish, sessile or subsessile, solitary axillary.more often spicate. Capsule broadly ellipsoid.

Distribution:

Indo-Malaysia and China.

Ecology and habitat:

It is common in stagnant water bodies, swamps and rice fields.

Flowering and fruiting:

August-November

Uses:



Limnophila indica (L.) Druce.

Limnophila gratioloidcs R.Br.



Vernacular name:

Keralata (O): Nanha lemcha (S); Losodara (M); Karpur (Beng.); Kuttra (H).

Family:

SCROPHULARIACEAE

Botanical description:

Small marsh herb, puberulous and glandular-pubescent all over or glabrous. Leaves pinnatifid, whorled, uppermost rarely undivided, lower capillary multifid, submerged ones much longer, multifid. Flowers white or pale purple, pedicelled, axillary. Calyx glabrous or somewhat pubescent, lobes linear, in fruit, acuminate, midrib prominent. Capsule subovoid, long.

Distribution:

Pantropical regions of the world.

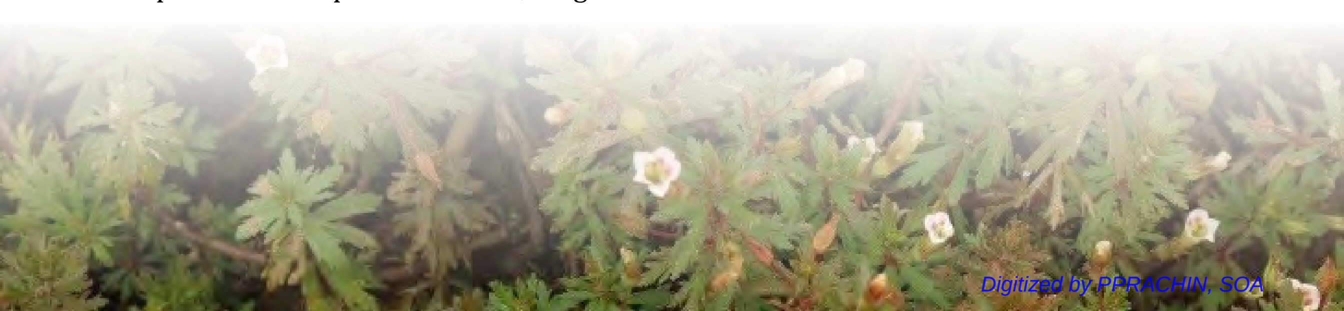
Ecology and habitat:

Common along borders of ponds, flooded paddy fields, wet low lands etc.

Flowering and fruiting:

September -February

Uses:



Trapa natans Linn. var. bispinosa (Roxb.) Makino.

Trapa bispinosa Roxb.



Vernacular name:

Pani Singada (O), Singhar, Paniphal (H, Beng.); Water chestnut (E).

Family:

TRAPACEAE

Botanical description:

Free-floating aquatic herb; floating leaves rhomboid, denticulate, serrate or incised with entire base, apex acute, red and densely villous beneath. Flowers white. Fruit obovoid, angular and broad with a short conical, often spinous beak with two spines at two angles, kernels edible.

Distribution:

Europe to East Asia Indo-china and North Africa.

Ecology and habitat:

A gregarious floating aquatic plant in northern sector.

Flowering and fruiting:

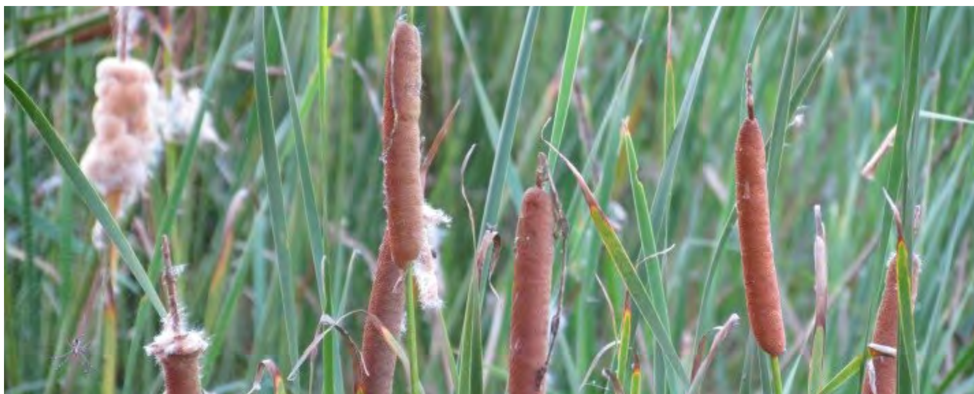
Fl: June- August
Fr: October.

Uses:

Useful for Elephantiasis, fevers, Rheumatism, Sunburn, Skin complaints. Fruits are edible.



Typha angustata Bory & Chaub.



Vernacular name:

Hangla, Santara (O); Hogla (Beng.); Patera, Pater (H).

Family:

TYPHACEAE

Botanical description:

Tall, robust aquatic herb with creeping rhizome. Leaves linear, upto 8 ft long, narrower above the sheath, plano- or concavo-convex, spongy. Flowers monoecious, minute, in terminal superposed, dense cylindric spikes, the upper spike male, lower of female flowers, often intermixed; bracts of female subspathulate, mixed with clavate tipped pistillode. Fruits minute, fusiform, membranous.

Distribution:

Europe to North America, Asia.

Ecology and habitat:

Quite abundant in marshes, swamps, margins of lakes, ponds, river beds and along streams.

Flowering and fruiting:

Throughout the year.

Uses:

Source of food for many frugivorous birds. The leaves are used for making mats.



Lantana camara Linn. Var. aculeata (Linn.) Moldenke

Lantana camara sensu Haines



Vernacular name:

Nagairi, Putus (O)

Family:

VERBENACEAE

Botanical description:

Straggling or subscandent, aromatic shrub; stems and branchlets conspicuously armed with recurved prickles. Leaves ovate or ovateoblong, 5-9 x 2-5 cm, crenate-serrate, acute, scabrid rugose above, glabrescent or shortly villous on the nerves beneath, base cordate or subcordate, cuneate or decurrent; petiole up to 2.8 cm long, prickly. Flowers usually white-pink or orange-yellow or variously coloured in gardens,scented, up to 1 cm long, in short capitates spikes appearing superficially subumbe-llate when young; peduncles axillary, equaling or exceeding the leaves; bracts lanceolate, strigose, equal, shorter than the corolla. Corolla hypocrateriform, tube slender, pubescent, limb 7.5 mm across. Drupe black, globose, ca. 3 mm diam.

Ecology and habitat:

Found everywhere near road side, agricultural land, grasslands etc.

Distribution:

Widely naturalized in India. Probably native to the west Indies.

Flowering and fruiting:

Throughout the year

Uses:

Fruits eaten by birds

Marsilea minuta Linn.



Vernacular name:

Sunsunia (O)

Family:

MARSILEACEAE

Botanical description:

Rhizome widely creeping, branched. Stipes variable, 3-15 cm or more long, slender, glabrous or pubescent; leaflets, cruciform, oblanceolate or obovate, variable in size depending on the ecological condtions, usually glabrous, outer margin rounded, entaire or sinuate or crenulate. Pedicels 2-6, basal and slightly connate or free. Sporocarps 2-4, very variable in size and shape, with a broad base, rounded in front, distinctly ribbed and bordered, glabrous or hairy, with two unequal projections or teeth, the upper one longer; sori 8-12.

Ecology and habitat:

Throughout India. Java, Philippines

Flowering and fruiting:

Fr: November- March

Uses:

Leafs are edible used as livestock food

Marsilea quadrifolia Linn.



Vernacular name:

Sunusunia (O)

Family:

MARSILEACEAE

Botanical description:

Rhizome wide creeping with nodes ca. 1cm apart, submerged or partly exposed, rooting at nodes. Stipes variable in length, 5-25 cm long; leaflets 4, obdeltoid, 1-2 cm long, with entire to slightly undulate rounded apex, glabrous, veins dichotomously branched. Pedicels 2-3 together, connate. Sporocarp almost horizontal or a upwardly directed, rounded in front, neither bordered nor ribbed, with 2 low, almost equal horns; sori ca.20.

Ecology and habitat:

Widely distributed in India. Europe, Australia, China, Japan and in temperate regions.

Flowering and fruiting:

Fr: November- February

Uses:

Leafs are edible used as livestock food

Azolla pinnata R.Br.



Vernacular name:

Family:

SALVINIACEAE

Botanical description:

Small, floating aquatic herb, 1.5-2 cm long and 1 cm wide, usually reddish towards the end of the rainy season. Upper leaflobe very small, imbricate, rhomboid or sometimes oblong, obtuse, papillose on upper surface; lower leaf-lobe membranous. Sori paired. Masulae without glochidia. Macrospores with 9 swimming-bladders.

Ecology and habitat:

Common floating aquatic; also in rice fields

Distribution:

Throughout India. Asia, Australia, Africa

Flowering and fruiting:

Fr: September

Uses:

Salvinia cucullata Roxb. ex Bory



Vernacular name:

Family:

SALVINIACEAE

Botanical description:

Leaves subsessile, unequal subopposite; lamina broadly deltoid with rounded corners, 1 cm long and 1.2 – 1.8 cm broad, with a shallow notch at tip, basal margins cordate and inflexed to form cup-like shape; upper surface covered with hyaline uniseriate hairs, lower surface with sparse brown acicular hairs more aggregated near midrib. Submerged organ with short (3-5 mm long) cylindrical axis, terminating in one or two sporocarp bunches surrounded by 16-20 simple, filiform root-like 2-3 cm long branches covered with long acicular hairs. Sporocarps sessile, globose; megasporocarps 2-3, distally produced, 2 x 1.5 mm, slightly flattened, rest all microsporocarps.

Ecology and habitat:

Many parts of Asia, America Africa and Europe

Distribution:

NE. India (Assam, Bengal). Sumatra, Malaya and Western Australia

Flowering and fruiting:

Uses:

Used as livestock feed and fish feed.



5.0 GLOSSARY

Achenes	A small hard
Acuminate	Tip drawn out into a narrow prolonged termination
Acute	Tip forming an acute angle, without a special tapering
Appressed	Laying flat for the whole length of the organ.
Awns	A bristle like appandages specially on glumes of grasses
Berry	A fleshy fruit with usually a massive, soft and juicy pericarp which is differentiated into outer epicarp and a massive fleshy mesocarp
Bracteate	Provided with bracts.
Caducous	Falling off early
Caespitose	Growing in tufts like grass
Campanulate	bell-shaped
Canaliculate	A diminuntive of canal
Capitate	Head-shaped or at the apex.
Capitulum	Inflorescens like a head.
Capsule	A dry dehiscent fruit formed from a multicarpellary syncarpous gynoecium dehiscing in a variety of ways
Carinate	With keel like a boat.
Cauline	Stem or stalk flowering
Chartaceous	Papery or paper- like
Ciliolate	finely fringed.
Circinate	Rolled up spirally like a watch spring from the apex to the base
Circumscissile	Fruit opening by apical lids
Clavate	Club-shaped, thickened towards the apex
Colic	Characteristic pain felt in the abdomen as a result of complete or partial blockage of one of the hollow tubes intestines, ureter and bill-duct.
Connate	Born at the same time
Cordate	Heart-shaped.
Coriaceous	Tough and rigid, leathery

Corymb	A raceme relatively shorter and broader, the lower flowers bearing longer stalks relatively to the upper ones so that all the flowers reach the same level
Crenate	Teeth on the leaf margin rounded
Cucullate	Cup-shaped
Cuneate	Wedge shaped, triangular
Deciduous	Lasting only for a single season
Decumbent	Reclining
Decurrent	Running down
Dentate	Margin with teeth directed outwards, not towards the apex of the blade
Dichotomous	With forked boughs
Digestive	Promoting digestion
Dioecious	Unisexual flowers. The male and female flowers are present in different plants
Distichous	Having two rows; arranged in two rows.
Diuretic	An agent that increases the output of urine
Dropsy	An excessive accumulation of clear or watery fluid in any of the tissues or cavaties of the body
Drupe	A fleshy fruit having its pericarp differentiated into outer epicarp, middle mesocarp and inner stony endocarp
Dysentery	A condition in which there is diarrhoea with passage of mucus and blood, and pain or discomfort in the abdomen.
Echinate	Prickly or spiny
Elliptic	Oblong but ends tapering towards both the ends
Emarginate	With a terminal notch
Endocarp	Inner layer of a fruit wall (pericarp)
Epicalyx	A collection of bracteoles on the outside of the calyx
Exocarp	Outer layer of the pericarp
Exserted	Protruded beyond
Febrifuge	That which cures fever
Fascicle	A close bundle of flowers
Filiform	Slender, thread-like

Fimbriate	With the margin boardered by long slender processes
Fistular	Hollow through out its length
Fulvous	Yellow, towny
Geniculate	Abruptly bent so as to resemble a knee-joint
Glabrous	Surface smooth; without any hair
Glaucous	Covered with bluish waxy gloss
Globose	Nearly spherical
Glochidiate	Pubescent with barbed bristles
Hastate	Halbert shaped, sagittate, with the basal lobes turned outward
Hirsute	Hairy
Hispid	Covered with rough bristly hair
Hoary	White or greyish white
Hyaline	Colourless or transluscent
Imbricate	Overlaping
Indehiscent	Fruits which do not open to disperse their contents
Involucre	A ring of bracts surrounding several flowers.
Keeled	Petals with longitudinal narrow outgrowth or ridge
Kernel	Seed inside a stony endocarp of a drupe
Lanceolate	Flattened, 2-3 times as long as braod, widest in the middle
Lemma	The flowering glume of a grass
Ligule	A tongue-shaped structure enclosing grass culms
Lumbago	Pain in mid or lower back
Lyrate	Lyre- shaped; pinnatifid with terminal lobe large and rounded, lower lobes small.
Mericarps	A portion of a fruit that splits away like a perfect fruit.
Monoecious	Having separate male and female flowers, but in the same plant
Mucronate	Leaf tipped with a short sharp point formed by the continuation of the mid-rib.
Obconic	Conical but attached at the narrower end.
Oblanceolate	Lanceolate but tapering towards the base
Oblong	Elliptical but blunt at each end, having nearly parallel sides

Obovate	Having the general shape of the longitudinal section of an egg
Obtuse	Rounded or blunt
Orbicular	Flat, with a circular or almost circular outline.
Ovate	Shaped like the longitudinal section of an egg, widest below the middle
Ovoid	Solid, like an egg in form, and attached by the broader end.
Palea	The inner bract or glume in grasses
Palmilobed	Digitately lobed like palmleaf.
Panicle	A branched raceme, with each branch bearing a raceme of flowers
Pappus	Various tufts of hairs on achenes or fruits
Pectinate	Comb-like
Peduncle	Stalk of a flower or inflorescens
Pellucid	Wholly or partially transparent.
Perianth	The floral envelope; it includes the calyx and corolla or any of them.
Pilose	Bearing a scattering of simple moderately stiff hairs
Pinnatifid	Pinnately cleft or divided.
Plaited	Plicate
Pluriseriate	In several series/ layers/ lines.
Prostrate	Said of a stein which lies on the ground for all or most of its length.
Puberulous	Slightly pubescent
Pubescent	Covered with fine hairs
Pungent	Having a strong, sharp taste or smell
Pyriform	Pear-shaped
Rachis	The main axis of an inflorescence or a compound leaf.
Radical	Arising from the root or its crown
Receptacle	Enlarged end of a flower-stalk or peduncle bearing the flowers
Refrigerant	Cooling
Reniform	Kidney-shaped

Repand	With slightly uneven margin
Reticulate	Having the surface marked by a network of fine upstanding ridges
Revolute	Rolled back from the margin or apex
Retuse	With a shallow notch at a rounded apex
Rugose	Having a wrinkled surface
Sagittate	Arrow-shaped
Scabies	An itch or mange, caused by mites, especially when marked by the formation of exudative crusts.
Scabrid	Having a rough or file-like surface
Scandent	Climbing
Scapigerous	Scape-bearing; a leafless floral axis bearing flowers
Scorpioid	Branches developing alternatelt to left and right but do not lie in the same plain
Serrate	Toothed margin with pointed teeth projecting forwards
Serrulate	Serrate but with very small teeth
Sessile	Lacking a stalk
Setaceous	Bristle like
Sinuate	With a deep wavy and cut margin
Spadix	A spike of flowers with a fleshy axis, enclosed in a spathe
Spathe	A large bract, often coloured, or membranous, enclosing a spadix.
Spathulate	Spoon-shaped
Spiciform	Spike like
Spike	An indeterminate inflorescence with sessile flowers on a common elongated axis.
Spinescent	Ending in a spine or sharp point
Spinulose	With small spines or spinules
Stellate	Star-like
Straggling	Diffuse climber
Stoloniferous	Sending our stolons or suckers/ runners.
Strigose	Bearing hairs which are usually rough and all pointing in the same direction

Subsessile	With small stalk
Subulate	Awl shaped
Suffruticose	Some what shrubby
Terete	Cylindrical.
Testa	Seed coat
Tomentose	Covered with a felt or cottony hairs, downy
Tuberculate	Beset with knobly projections or exprescens
Truncate	Ending abruptly, as if cut off
Umbellate	Having the inflorescence of umbels or umbrella form
Uncinate	Hooked
Urceolate	Pitcher-like of urn-shaped
Urticle	Fruit surrounded by membranous sac.
Verrucose	Full of warts.

6.0 SPECIES INDEX

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7.0 REFERENCES

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He is currently working as Chief Executive, Chilika Development Authority. He has joined Indian Forest Service in the year 1989 and posted as Divisional Forest Officer in various Forest Divisions during initial days. Later he served as Director in various departments of Government of Odisha. For his contribution to forestry sector, he was honoured with the Indira Priyadarshini Vrikshamitra award in 2007, the highest award in Forestry in India. After joining the CDA, his work is commendable for eviction of the illegal prawn gherries from Chilika Lagoon which allowed restoring the wetland of international importance. He is the key person for restoration of the Ansupa Lake. Apart from this, he is an avid Naturalist and Conservationist. Being a scientific person, he has published many research papers related to wetland biodiversity in various international journals. He has also co-authored the prestigious book 'Fish and Shellfish Diversity and its sustainable management in Chilika Lake', 'Birds of Ansupa' and 'Fish and Fisheries of Ansupa Lake'.

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Born in 1952 in Bhubaneswar, completed M.Sc., Ph.D, Post-Doc (Limnology) and joined in Fisheries Department during 1983. Deputed to Orissa Remote Sensing Application Centre (ORSAC) as Scientist in 1990 and to Chilika Development Authority, Bhubaneswar in 1996 as Scientific Officer and continued till 2010. Worked in association with International Institutions like World Bank, JICA as well as with National Institutes like CIFRI, NIO, WISA, BNHS, CWPRS, NRSA, IIT, NCSCM etc. Published research papers in national and international journals, technical reports and co-author of books related to Chilika fisheries, wetland ecology and biodiversity. He has guided a number of students leading to the award of Ph.D, M.Tech, M.Phil and M.Sc. He has been the member of several technical committees related to the study of Chilika Lake and other wetlands in the country. He is also life member of Odisha Bigyan Academy, ISRS, Dehradun, IAVPB, USA and ISME, Japan. After his retirement, he has been engaged as a Consultant in Chilika Development Authority, Bhubaneswar and continuing as such.

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He is presently working as Assistant Conservator of Forest in Chilika Development Authority. He is a sincere and dedicated forest officer. Being an outstanding officer, he has rescued and saved various species of Birds, Mammals and Reptiles. He is the key person in the discovery of a rare grass species *Coix aquatica* from Similipal Biosphere Reserve. Besides the forest officer, Dr. Nanda is a well-known face as a dynamic Poet, Writer, Critics, Editor and Researcher in Odia Literature too. He has written more than 25 books and recipient of several prestigious literary awards. He played a significant role in publishing various wildlife articles and books in regional language. He is a sincere forest officer and a passionate wildlife lover as well. He is also co-authored the book 'Birds of Ansupa' and 'Fish and Fisheries of Ansupa Lake'.

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